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HYDRO ELECTRIC ENQUIRY COMMISSION

QUEENSTON - CHIPPAWA

EVIDENCE BY CONTRACTORS

TORONTO, MAY 18TH, 22ND AND 23RD, 1923.

W. C. Coe
Official Reporter

HYDRO ELECTRIC POWER CO. OF ILL.

EVIDENCE BY CONTINUED

HO

W. L. GARDNER
ATTORNEY AT LAW

HYDRO ELECTRIC INQUIRY COMMISSION.

36 KING STREET EAST, TORONTO.

FRIDAY, 18th MAY, 1923.

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General manager Foundation Company Montreal, General contractors	5360
Specialize in foundation work and Hydro- Electric power	5360
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Took a lump sum contract in 1916	5362
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Commission or Mr. Acres invited me to confer with them at Toronto	5366
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THE HYDRO ELECTRIC INQUIRY COMMISSION.

36 KING STREET EAST, TORONTO.

Friday, May 18th, 1923.

P r e s e n t :

W.D.GREGORY, Esq., Chairman.

M.J.HANEY, Esq., Commissioner.

J.A.ROSS, Esq., Commissioner.

R.A.ROSS, Esq., Commissioner.

J.H.W.BOWERS, Esq., Secretary.

QUEENSTON-CHIPPAWA

Evidence by contractors.

HUBERT E.LARKIN.

Examined.

TO THE CHAIRMAN:

Q. You are in the contracting business? A. Yes, Sir.

Q. In Toronto? A. No, for the past twelve years in New York State and Texas, and previous to that time in Canada, the Province of Ontario.

Q. Have you an office in the Province of Ontario at the present time? A. No, we have not been doing any contracting work in the Province of Ontario for the past three years.

Q. Do you live in the City of Toronto? A. No, Sir, I live in the City of St. Catharines.

Q. I have a copy of a letter written by Mr. Gaby, the Chief Engineer of the Hydro Electric Power Commission of Ontario, to yourself, dated December 27th, 1916, reading as follows: "Re Niagara Development: We are mailing you under separate cover plans and specifications covering earth and rock work in the power canal which will form part of the above development. We would like you to submit a tender price per yard for the excavation of earth and rock in connection with this work, the said figures to be in our hands not later than January 5th, 1917. We will be glad to give you further information as to estimated quantities, or any other information available which may be of use to you".

Q. You received that letter? A. Yes.

Q. I have here a copy of a letter written from Buffalo dated, December 30th, 1916, from Larkin & Sangster, per H.E. Larkin, is that yours? A. Yes, that is our reply.

Q. Did the Commission furnish you with any data to enable you to reply to their letter? A. I think they sent us some plans and quantities, that is all.

Q. Did they send plans and information to you which would have been sufficient for you to put in a tender if you had thought of tendering on the work? A. Well, of course, if we had tendered on it, the only form of tender we would have put in would have been cost-plus.

Q. Did you have sufficient data to enable you to put in a tender for the work or would you have required to obtain further information and make further investigation?

A. No, I think we had sufficient information, as I recall it

TO COMMISSIONER HANEY:

Q. You had general knowledge of the location and character of the work and situation previous to receiving this letter? A. Yes.

TO THE CHAIRMAN:

Q. In your letter of December 30th to Mr. Gaby, you say that you understood that the Commission intended to undertake the work itself. How did you get that information? A. My recollection of it is that at the time the public press carried the almost absolute information, I thought, that they were going to do it, and not give any consideration whatever to the acceptance of tenders, to giving it to any contractor.

Q. There were references to the work in the press?

A. Yes.

Q. From that ^{you} received the impression that the Commission planned to do the work itself? A. Yes.

TO COMMISSIONER HANEY:

Q. Did you regard their request for tenders as a check more than asking for bona fide tenders? A. Yes, in fact, we were assured at the time, that the Government - and Mr. Haney will know very well - that Deakes & Hine, who were at that time the Dominion Construction Company - they formerly had been the Toronto Construction Company and changed their name to the Dominion, and we afterwards formed a partnership with them with the idea of tendering on two of the jobs, sections three and section 2. I think we called the company the Consolidated Construction Company. Deakes & Hine asked me if we were going to bid on it, and I said "There is no use bidding on it; they do not intend to let it to a contractor". They afterwards

told me they had put in some bid.

Q. You did not take the request for a tender seriously?

A. No.

Q. Even on a cost-plus basis? A. I do not know what might have happened as a result of cost plus, but we were quite positive no contractor was going to bid on it on a schedule basis at the time; he would have been a very foolish contractor if he did.

Q. Your impression at that time was from what you had seen in the press they were going to do the work themselves?

A. Yes.

Q. Did any of these communicate with the commission at all saying they would be prepared to do the work themselves? A. No, just my impression from what I saw in the paper.

Q. What were the conditions that you speak of, that would prevent you from putting in a tender? A. The condition of the labor and material market; the great shortage of labor owing to the war conditions and the war conditions that obtained and applied to the possibility of getting material - anything that a contractor might require could easily have been commandeered by the Government for the prosecution of the war. In my judgment it was a very foolish procedure for a contractor to attempt to put in a bid on a schedule basis.

TO COMMISSIONER HANEY:

Q. You could have made a contract for all the materials you required on a firm basis? A. No, not for the period covering that construction.

TO THE CHAIRMAN:

Q. I think the Hydro engineers in some of their communications said that they had made contracts in advance for some of their material and were getting their material at lower prices? A. I do not think any concern like a cement company will give them a contract to cover their requirements for the entire period.

Q. What about plant? A. They might for their plant, but still with the plant it would very likely be delayed in delivery.

TO COMMISSIONER J.A.ROSS:

Q. You could get all the cost plus work you wanted at that time? A. Yes, at that time.

Q. Therefore there was no motive or reason for taking a fixed price contract? A. No; we would not have taken a lump sum contract under any consideration.

TO THE CHAIRMAN:

Q. You say in your letter "Your decision to use electric power is well advised in view of the price at which you will be able to obtain it, and a very great saving in construction cost should result" - would you mind enlarging on that? A. At that particular time, the idea seemed to be that they were going to use electrical equipment. The reason I knew of that was that I knew one of the officials of the Bucyrus Company that had been up here negotiating with the Commission for some of the plant.

Q. Shovels? A. Some of the plant, I forget what.

Owing to the location and the particularly cheap power that they could get there, I thought the tools of that description were the most suitable plant for the undertaking.

The first thing I noticed when I stepped out
of the car was the cold. It was a sharp contrast to the
warmth of the car. I shivered as I walked towards the
entrance of the building. The air was crisp and clear,
and I could see the stars in the night sky. The
building was a large, imposing structure with many windows.
Some of the windows were lit up, while others were dark.
I walked up the steps and entered the building. The
interior was dimly lit, and I could hear the sound of
footsteps on the floor. I walked through a long hallway
and reached a large room. The room was filled with people,
and I could hear the sound of voices. I walked towards
the front of the room and stood in a line. I waited for
a while and then I was called forward. I stepped up to
the podium and spoke to the audience. I felt nervous,
but I knew that this was my chance to shine. I spoke
for a few minutes and then I finished. I walked back
down the steps and felt a sense of accomplishment. I had
done it. I had given a speech. I was proud of myself.
I walked back to the car and got in. I felt a sense of
relief. I had survived. I had done it. I was a winner.

Q. Could they get power cheaper than anyone else?

A. I would think they could.

Q. Of course they controlled the power themselves?

A. They owned the plant; I assume they could get it at a cheaper rate than they would sell their product to a corporation or consumer.

Q. At a less rate than a contractor could have got it?

A. I would think so.

Q. In what way would it lessen the cost of construction aside from their getting cheaper power; was there increased efficiency through having the work done by electric power? A. I should think in that location there would have been. That would not obtain in every location, but in this particular spot with cheap power available right at their doors, I would think it would have that effect.

Q. You say a very great saving in construction cost should result by using electric power; what saving had you in mind? A. The fact of their building very large machines, in fact, I guess about the biggest electric shovels that were ever built for construction. I got that information from this man that was negotiating with them.

TO COMMISSIONER HANEY:

Q. They contemplated building these? A. Yes, ^{un}usually large shovels; with the power available there, in my opinion, that was a very cheap method of construction. Furthermore had they undertaken it, I do not suppose an ordinary contractor would have money enough to buy a plant like that, and if he had, he might not buy it having in mind this point: that when the work was completed he could more easily dispose of steam equipment than electrical equipment;

there would be much greater demand for a steamplant.

Q. The cost of doing the work by electrical equipment might be a lighter cost, and the salvage might be less in disposing of the plant? A. Yes, if they could not get a fair amount of salvage, it would, from the standpoint of the ultimate disposal and sale of the plant, affect them in that way.

TO COMMISSIONER HANEY:

Q. As a contractor, would you have considered electrical equipment for that plant having in view the disposition of your plant after the work was completed?

A. No, as a contractor, I would not have considered it.

TO THE CHAIRMAN:

Q. Would that be by reason of the fact that you might find difficulty in disposing of it? A. Yes, solely.

Q. Or using it in any other plant? A. The possibility of using that electrical equipment would only be in isolated cases, whereas a steam plant would be much more readily sold and that would be a reason for an ordinary contractor wanting to use a steamplant.

Q. Were there any electrically equipped plants being used to any extent at that time? A. Yes.

Q. In places that you knew of? A. Yes.

Q. Were they doing the work satisfactorily?

A. Yes, they did the work satisfactorily; they did have some trouble with the drills, but the hoists and shovels worked successfully, but the drills were not so successful.

Q. If electrical machinery was being used in other places at that time, and continued to be used, what would be the difficulty of disposing of the plant at the termination of

the contract? A. As an illustration, take Kensico, there is a great deal of electrical equipment used there, and most of that equipment is still on the market; it was not saleable for the reason of the difference in the currents at the different points. Take Seneca Falls and other places, there might be different cycles, and you might have a contract where you would use electrical equipment but you would not have the cycle that would be suitable for that particular class of work.

Q. The market was very limited? A. Yes.

TO COMMISSIONER R.A. ROSS:

Q. In what places have they used a large electrical plant? A. They used them at Kensico.

Q. What size? A. I do not know. Everything was electrical there, and the only criticism I heard of any of the plant was the drill.

Q. They tried to use electrical drills? A. Yes, they did use them. I saw a lot of that plant three years ago somewhere around White Plains.

Q. Are there any satisfactory electrical drills?

A. I do not know as to drills.

TO COMMISSIONER HANEY:

Q. The drop drill will work? A. Yes.

TO THE CHAIRMAN:

Q. Having in view the difficulty of realizing on your plant on the termination of your work, can you think of any way the Commission could have constructed this work at less cost; could it have been done by the use of the steam plant rather than an electrical plant?

A. I do not know that they could if their object was to complete the work quickly.

Q. Aside from that? A. Aside from that, they would have an ultimate salvage greater with steam.

Q. Would the increased efficiency during the period of operation more than make up for the additional loss in disposing of the plant? A. No, I do not think it would; I think with electrical equipment such as they had on that particular job, it warranted the expenditure.

COMMISSIONER R.A.ROSS:

Q. At that time coal was very difficult to get, and further than that, they would have to put in water tanks and coal yards and loading yards and all that sort of thing, and boiler tubes and repairs? A. Yes, I think that was a well advised expenditure.

COMMISSIONER HANEY: Q. They had more steam shovels on the work than electrical shovels? A. About the same.

COMMISSIONER R.A.ROSS: They had about 19 shovels?
A. Yes, and cranes.

THE CHAIRMAN: Q. In the matter of labor, would there be any saving in using electrical power instead of steam; would the use of electric power be a factor in reducing labor? A. It would be a factor, but to what extent, I would not be prepared to say. I think there would be less labor.

COMMISSIONER HANEY: Less labor in the service but not in the actual operation? A. No.

Q. In the supply of coal and things of that kind, there would be less labor with electricity than with steam? A. Yes.

TO THE CHAIRMAN:

Q. In your letter you speak of the difficulty of the contracting firm purchasing the requisite amount and type of plant to do the work, and I think you said it would take a year or 18 months to secure it? A. For the manufacture of the equipment.

Q. You say: "We do not know of any contracting firm on this continent which can meet the above requirements or which could meet them by the purchase of a new plant of the requisite type inside of one year or eighteen months"?

A. Yes.

TO COMMISSIONER HANEY:

Q. Are you referring particularly to an electrical plant?

A. Yes.

Q. Could you get a 60 or 70 ton steam shovel with the necessary locomotive equipment and car equipment within six or eight months? A. You possibly could, but at that time there was great difficulty of getting delivery of anything like that. Nearly all the concerns in the United States had war orders, even at that time.

Q. The chances of getting steam shovels would be better than the chances of getting electrical shovels?

A. You would get them more quickly.

TO COMMISSIONER J.A. ROSS:

Q. So that the price charged would be whatever they cared to bill you at the time of shipment? A. At that time you would have to pay whatever they billed you at the time of shipment; they were not anxious for business at that time. I know we had a locomotive crane at that time, and we used it for six or eight months, and sold it for more money than we paid for it.

TO COMMISSIONER HANEY:

Q. Do you think it was practicable to finish the work in three years? Three years was the time given at that time?

A. It was a big undertaking.

Q. 9,000,000 cubic yards of earth on top of 4,000,000 cubic yards of rock; it looks almost impossible?

A. It was a very short time to do it in, and it would require tremendous plant expenditure. That is why I thought it was not feasible.

Q. We are speaking about practical? A. Of course it was practical, but I do not know of any contracting firm that would have had the money to invest in a plant of that kind so as to finish it in time.

Q. There are some big contracting firms? A. Yes, but I do not know of any contracting firm, no matter how big, that could afford to pay \$5,000,000 or \$10,000,000 for a plant.

Q. Why could not they afford to pay as much as the Commission? A. They could if they got the job on some rental sort of basis for the plant and a lump-sum job. I do not think any contractor at that time, no matter what his financial standing might be, ~~who~~ would be willing to plant that job properly on a schedule basis.

Q. To do it in three years? A. To do it in three years, having in view the topsy-turvy condition of everything.

TO THE CHAIRMAN:

Q. Was that the great difficulty in the way of getting a contractor to undertake the job? A. Yes.

Q. The acquiring of the plant? A. No, not that particularly; that plus the condition of the labor market

Q. Supposing the Commission itself had agreed to supply the

plant to the contractor and finance that part of it, would that have been possible under these conditions, and have contractors take the work? A. Yes, do you mean at a fixed sum?

Q. At a fixed sum? A. No, not at that time.

Q. Would the difficulty be the labor market? A. Yes, no contractor would take it.

Q. These were the two difficulties in the way of a contractor; the labor market and the cost of the plant?

A. Yes, they were.

Q. If it had not been for these difficulties there would be no difficulty to get a contractor to take the job at a fixed price? A. No.

Q. Aside from these two questions was there any other?

A. Yes, the material; the contractor at that time absolutely could not buy supplies, and he would not touch it.

Q. There would be difficulty in that way? A. There would.

Q. Speaking generally, do you think the Commission doing the work itself, could do it as cheaply as the contractor could do it, if the contractor had been in a position to take the contract? A. Ordinarily I do not think any Commission or State or Province can do work as cheaply as a contractor.

Q. Why not? A. Because the contractor has got an organization that has been operating for him for years, and he knows the efficiency and capability of the different men whom he has probably trained himself. He knows what he wants them to do and that they can deliver the goods. Whereas a Commission or State undertaking a work of this kind, it would be necessary for them to organize and go

here and there to pick up the men that they thought would probably head each department in a proper way. A big contracting firm would have that organization already to sell you. The Commission would have a new organization, and as a result an untried organization up to a certain point.

Q. You might not be able to get the same degree of efficiency from it as a contractor with an experienced organization? A. In normal times that is correct, but at the particular time when this was undertaken, I do not think it would have made a particle of difference whether it was a contractor, Commission or a State. I do not think it would have made much difference in the ultimate cost; things were so terribly topsy-turvy, you did not know from day to day what was going to happen.

Q. Did you know the Commission did make an estimate of the cost at that time or a little later date, and submitted it to the Government? A. Just what I read in the papers, that is all.

Q. They did make an estimate of cost? A. I assume they did. As a matter of fact, I did not know it until I read it in the paper.

COMMISSIONER R.A. ROSS: Q. Do you think any group of men would be as efficient working for the Government as for a contractor; is not there a great chance of men taking it easy when working for the Government? A. There is.

Q. They say the Government has lots of money, but the contractor knows he has got to get it done, for a certain figure and keep down every possible cost? A. Human nature, I guess.

TO THE CHAIRMAN:

Q. If you had been in the place of the Commission and had to have the work done, how would you have gone about the organization of your force to do it? A. I would have split the organization up under proper headings, the engineering first, then construction, then operating; I would have had probably three or four divisions, and then I would have endeavored to secure as a result of investigation, the best men from the standpoint of their reputation and performance that I could get to head these departments. That is what a contractor would do with a big undertaking. Of course he would know the men he was going to put there. In the particular case of the Commission, it would be necessary for them to investigate the standing of the various heads that they purposed employing.

Q. Do you know the man who was employed to take charge in this case, Mr. Angell? A. By reputation I know him. I think he was superintendent at Kensico Dam for the New York Water Supply System.

Q. Was that after he was there? A. No, I knew George Angell by reputation.

Q. Did you know him on other work? A. No, I never knew him personally.

Q. Can you tell us to what extent, the cost of construction had increased, at the time this correspondence took place, over pre-war conditions? A. On work that we were doing, our records show that it had increased from 75% to 150%.

Q. At that time? A. Yes. We had a job at Galveston, Texas, and material did not enter into it because we tied up on the re-enforced steel and the concrete with big

companies and they delivered all the way through. The labor end of it was not so bad in 1917 with us. Of course Southern conditions are different. We employ negroes and Mexicans. But our records show that in 1918 our labor cost went up all the way from 75% to 150%.

Q. This letter of yours was written in 1916? A. Yes, the latter part of it.

Q. Did labor continue to be about the same for sometime after that, or was there an increase? A. There was an increase.

Q. Would it be a yearly increase? A. We finished the job for the State of New York at Seneca, N.Y., in the latter part of 1915, and our rate for unskilled labor at that time was \$1.75. The next contract was a bridge at Oswego, New York State, and we increased the wages from \$1.75 to \$2.00.

Q. What date would that be? A. That would be in about the spring of 1916. Then we increased again to \$2.25. That would be also in 1916, and then in 1917, we increased to \$2.50. The labor that was available at that time was not as good; it was bad; it was not to be compared with the \$1.75 labor of the year or two previous. From that it went up to \$5 and \$7 a day.

Q. Did that take place in 1920? A. Around about 1919.

Q. About what part of 1919? A. In the summer of 1919 they were paying these wages. No, I am wrong in 1919; it was the latter part of 1917 and 1918. When the United States was in the war, they were paying very high wages for common labor.

Q. Did that apply in Canada as well? A. Yes; we did not pay

that in the South.

Q. Where you were working? A. Yes.

Q. What increase took place in wages after the spring of 1919 - A.. Until when?

Q. Until any time. Was there any increase after the spring of 1919? Were you paying the top prices at that time or did they go up or come down from then on?

A. Where we were located, they remained the same, but you must understand that the rate of wages in the South is a different proposition to the North.

Q. Where were you working at that time? A. Galveston, Texas.

Q. You were paying less there? A. Yes; you always do.

I would say off hand, where you would be paying \$4.00 in the North for common labor, we would be paying \$2.00 in the South, at all times.

Q. Do you get more efficiency in the North than in the South? A. Yes, you are solely dependent on negroes and Mexicans in that section. We have no white labor at all except skilled labor.

Q. Mr. Larkin, supposing in spite of all these difficulties, you had taken that job to build the canal in three years time, what method would you have adopted?

A. We would have to purchase large units of plant - units with large daily capacities.

Q. Would you plan your work to do so much within a certain time - say, each year? Would you require a plant that you could do so much with by a certain date? A. We would.

Q. Would you spread out the work so that you would plan to do so much for each year, and have it completed at the end of the three years? A. Yes, always having a factor of

safety for unforeseen conditions.

Q. Would you have a factor of safety as well? A. Yes.

Q. So really your plans would be a little in advance of your time? A. If it had been possible to do that.

Q. You see the Commission itself undertook what a contractor would have undertaken; they had the resources at their back which a contractor would not have? A. Yes.

Q. I am speaking of methods; how would you as a contractor, if you had been in charge of the work, how would you have gone about it, so as to assure yourself that you would have had it done at the time that the Commission say they planned to have it done? A. I would have attempted to map out a general method of progress; so much each year, having in view the climatic conditions that would have to be dealt with, namely that you would not expect to do as much in the winter time as in more seasonable weather, but still realizing that it would be necessary to operate in winter. If the ordinary contractor has time, he does not operate in our climate for three or four months in the winter.

Q. Having planned to do it in a certain time and for a certain price, how would you know as you went along whether or not you were keeping up your schedule and keeping up within the price that you had fixed upon as the price for which it could be done? A. My force account, the number of men on the work plus the materials, or invoices

would show what the work was costing approximately.

Q. Would you know each month what it was costing you?

A. Approximately.

Q. You would have your unit cost for each month?

A. Approximately.

Q. For labor and material? A. For labor and material.

Q. Then you would know at the end of each month or any certain period, whether you were running ahead or behind your estimate? A. Yes, approximately I would.

Q. So far as the plant is concerned, would you plan to have ~~x~~ the full amount of plant required at work at the start, or would you add to it from time to time?

A. Of course that would depend on how the work developed. Ordinarily, of course, a contractor would not put the entire amount of plant on the job at once; he would only put it on as he required it. If he knew the proposition entailed the purchase of ^{steam} ~~stx~~ shovels, certain of the shovels being for rock and certain for earth, he would not buy the three rock shovels until he was ready for them.

TO COMMISSIONER HANEY:

Q. Would not you plan your work so as to use your earth shovels for the rock? A. Yes, it would be necessary to change the ^lipper.

Q. But you would use the same shovels for removing the earth as the rock? A. If you had in mind the quick completion of that work.

Q. I am assuming you had three years fixed to do it in, how would you arrange your schedule to do it within that period, and in the matter of plant, how would you arrange

that. Would you have brought on all your shovels to remove the earth? A. Just as quickly as I could get on.

Q. The full number of shovels? A. Yes, the natural assumption being that you would start in at once, as soon as you could get your units at the different points, you would immediately install them, and you would install the necessary equipment in the way of cars and so forth

Q. Service tracks and disposal trestles? A. Yes.

Q. Would you uncover the rock so as to get to work on the rock? A. Yes, where it was feasible; if it was not too heavy.

Q. Have you a profile of the Chippawa work? . Here is the top lawyer of earth (referring to page 131); there is 9,000,000 cubic yards. Would it be advisable to do the work as shown on this profile or keep right on the surface and use a number of shovels and get the earth off so that the rock would be reached as quickly as possible; or do you think it would be more practicable to do the work as outlined by the black lines, that is working in short sections. We want some man to tell us the method a practical man would have followed? A. Of course the best would be to get this earth off the top.

Q. And then work this from the top in sections?

A. That would be the usual method.

COMMISSIONER R.A. ROSS: They are pretty long sections? A. Of course the usual method is taking the earth off.

Q. Would it assist the drainage to some extent? A. It should.

Q. It would assist the drainage by getting the top off first?

A. Yes.

TO COMMISSIONER HANLEY.

Q. So that by taking the top off, you would reach this ledge, and then work there in place of attempting to take the whole thing out from the bottom with the big shovel?

A. Yes, that would be the usual method, to strip off this earth.

Q. Take the earth out first? A. Yes, take the earth out and get to the rock.

Q. All the way along? A. That is the usual method, but what they contemplated doing, I do not know.

Q. That is the way they did it? A. Of course from the standpoint of speed, they might have been able to have done that work more quickly in that way.

Q. Would they? A. I do not know. In this particular location.

Q. How much work will a 70 ton shovel do, if it is served pretty well? A. We had a 65 ton shovel and a 2½ yard bucket.

Q. What did you get from them? A. It is a long while ago since we used that; I was just trying to think. I think about the best we did was somewhere along about 1700 to 1800 yards; we used four yard cars and narrow gauged equipment.

Q. Speaking of standard equipment with 20 yard cars, the service would be very much better? A. Oh, yes.

Q. The secret of steam shovel work is to keep the shovels going continuously? A. Yes, you must have good service; if you have a long haul it means increased equipment.

Q. Do you remember the lift and swing of one of these 65 ton shovels? A. Yes.

Q. Three minutes, three buckets a minute, that is what the Bucyrus Company claim? A. Yes.

Q. They would average two yards to the lift? A. Yes, two yards, depending on the excavation.

Q. That would be six yards to the minute, and that is 360 yards an hour, or 3,600 yards in ten hours, making a deduction of 30% or 40%? A. Yes, of course delays come in there to reduce that.

Q. The delays are in the service? A. Yes, and ordinary break-downs and the moving of the shovel; it would sometimes take a day to move the shovel back.

Q. There would not be much moving back in this work?

A. No.

Q. On that basis, assuming they did 2,000 yards a day, 25 days, 50,000 yards, and with 10 shovels, 500,000 yards a month, and in ten months, 5,000,000 yards, leaving two months for winter weather. Six months in the summer on double shift, and get out 6,500,000 yards in the year; I am speaking of the stripping? A. Of course, I think that is a fairly rosy estimate.

Q. We are on the supposition basis? A. Yes, if you look at it that way that would be the capacity of a shovel assuming that your service was absolutely perfect, and you had cars under your shovels all the time ready to dump in.

COMMISSIONER J.A. ROSS: And no break-downs in your equipment and no strikes? A. Yes, and efficient labor.

COMMISSIONER HANEY: Q. Steam shovels as they are built at the present time, do not have many breakdowns?

A. Not very many.

Q. They are very well built? A. Yes, they are very strongly built. The actual breakdown from shovels breaking and the cables breaking are not many. The great difficulty always seems to be to get the service, get the cars there; then you must always remember the difficulty of the different classes of excavation. You have slides on your dump and all these things go to upset the calculation. I do not suppose any man is in a position to say just what sort of difficulty he is going to encounter. We did the excavation on the Cataract Power Canal which we built for the Cataract Power Company, and the class of material there was the same as they had at Chippawa, and some of that was terribly stiff.

Q. Potter's clay? A. At the end; the slide comes out in enormous chunks and sticks to the bottom of the car, and when you get it on the dump, the whole thing would slide.

Q. You used dump cars? A. Yes.

Q. Did you ever have any experience with a plough? A. No.

Q. The disposal grounds for the Chippawa work were practically all on trestles? A. So I believe; I never saw it.

Q. It has been suggested that the earth might have been handled much better with a plough? A. That would depend on the material. I understand they had a lot of soupy material that probably might not have stayed on a flat car, and wherever you had that material, the plough method would not do, because if you dumped soupy material on a flat car, it runs right out, and under these conditions, I do not think the plough method would be good.

Q. Potters clay would do it better? A. Yes, clay would lend itself to that method. That of course would depend on the number of train movements. If you were having very heavy train movements, several hundred trains per day, I do not know just what difficulties you would encounter in the way of the ploughs on the trains.

Q. I assume the trains would be of sufficient length to minimize the train movements? A. You should have 30 or 40 cars to the train.

Q. Of course the cars they use the plough on now is practically a closed car, the Roger type? A. Yes.

Q. So that the soupy material might be held there as well as in a dump car? A. Yes.

TO THE CHAIRMAN:

Q. Was there much soupy material?

MR. FRANCIS: The worst I ever saw. They could not build the sides without riprapping with rock.

Q. That would depend on the season of the year? A. No, that would depend on the nature of the ground.

TO COMMISSIONER HANEY:

Q. That was due more particularly to the fact that they used large shovels. If they used smaller shovels, they could have stepped down and would not have had to lift 60 feet. I am talking to Mr. Larkin about an ordinary plant, not an extraordinary plant? A

MR. FRANCIS: I do not think that would have been the effect as I saw the ground.

WITNESS: They had very long booms and very long dippers on these shovels.

COMMISSIONER HANEY: As an ordinary contractor, would you ever buy these 320 ton shovels? A. You mean the electric?

Q. The steam and electric were the same so far as the working was concerned? A. No, as a contractor I would not, but if I was doing that work, if I was the Commission, and wanted to get that thing through, I would put on any kind of plant I thought was necessary to complete that job quickly. That is, if the financial end did not interest me. If I had all the money available that was necessary.

Q. If a contractor had in view doing the work economically? A. I would not have that plant, just for the reason that it would not be saleable.

Q. If you had to do it for a certain price, would that have an effect upon the method you would adopt and the method you would employ? A. Yes.

Q. If there was no limit on the price, you would adopt other methods? A. Yes, I might adopt the method they adopted there. If I was a contractor wishing to continue in business, and had a steam shovel outfit that would be suitable for the work at different places throughout the Continent, I would prefer to use the steam shovel plant, but only for that purpose.

Q. Leave out the element of time altogether, would you have used big shovels or smaller ones? A. On that job, I think I would have used the big ones having only in mind that particular job.

Q. And the time within which it had to be done? A. Yes.

Q. If it had not been for the matter of time, you would consider a more economical equipment? A. I am not prepared.

to say whether it would have been or not. I do not know what the result would have been with a different method of operation. I would say as a contractor, continuing in business, and having a class of plant which would be readily useable and readily replaceable, I would prefer it.

Q. That is what you call a standard plant? A. Yes, but whether that would have done this job within the time or more economically, I am not in a position to say.

Q. How did the labor market affect the wages of the men who were working on the shovels and machinery; was the cost of that increased proportionately as the unskilled labor? A. I believe not. I do not think the increase was as much, but there was a very, very heavy increase in the wages of steam shovel men in 1917 as compared with 1915-16.

Q. Aside from the question of the wages, was the efficiency of the steam shovel men fairly well maintained?

A. The actual operators, yes.

Q. There would not be the falling off in efficiency in their case that there would be in the unskilled labor?

A. No, there would not.

Q. It was in the unskilled labor that there was the great decrease in efficiency? A. Yes, the unskilled labor.

Q. We had a man who worked a shovel before us at Niagara, and he said so far as the men working on the shovels were concerned, their efficiency was maintained?

A. I should think that would be right. If he was a good operator in normal times, a man operating a steam or electric unit, there would not be any decrease in his efficiency if he was a good loyal workman.

Q. Did you ever have a night shift on any of your jobs?

A. Yes.

Q. What is your opinion as to the efficiency of night shifts as compared with day shifts? A. The night shift has not so great efficiency.

Q. What is the percentage? A. Well, I would say that a night shift will probably do anywhere from 15 to 25% less work than a day shift. That has been our experience on steam shovel work where we were forced to do night work.

Q. What proportion of the number of men employed on a night shift would you have as compared with a day shift on the same job? A. You would require the same number; the only difference would be that with a steam shovel, they do not pay much attention to where they dump at night, and the day gang trim the slope and get the dump ready for the night gang. In that way, you would have a few more men on in the day time.

Q. Do you find it difficult to keep the night gang at work? Do the men get off their jobs sometimes?

A. Yes, they do; they know when the time keeper is coming around, and some of them sleep.

Q. Could you say it is undesirable to have a night shift unless it is absolutely necessary to finish the job in a certain time? A. Yes, unless absolutely necessary; I do not like night shifts.

Q. In the Chippawa work we find that at one time, the number of men were so many more before they had the night shift?

MR. FRANCIS: I have not got these figures prepared yet.

COMMISSIONER HANEY:

Q. Before there was a strike they had about 2,000 men.

MR.FRANCIS: Then they jumped to 3,000 and dropped to 3,000 when they got the shovels started,

MR.LARKIN: The work that was being done at that time was done under most unusual conditions, the like of which you will never see again and never saw before. . You could not get work out of the men; there was no loyalty; they did not care; they heard the whistle blow and they got their wages, That was the way the men were with us. I do not know what these were like.

TO THE CHAIRMAN:

Q. Is there a fixed proportion among contractors as to the cost of the plant as compared to the amount of the contract; do they figure on the plant costing a certain percentage of the work?

A. Well you always have to buy a certain amount of plant to apply to a certain job; there are two ways of figuring; some contractors figure that every job should pay for the initial expenditure of the plant without having in view the salvage. In other words, if you bought \$100,000 worth of plant for a \$1,000,000 job, that is 10%, and if you figure that your job should earn the plant, of course that remains a fixture. On the other hand some contractors consider the plant a fair profit on the job; some contractors figure that every job should earn its plant.

Q. They are satisfied with that? A. Oh, no, I don't mean that. I mean that a contractor on a job figures, say on \$1,000,000 job, \$100,000 for equipment, and then he has so much for overhead and so much for superintendence and insurance, and then he adds his profit to that of 20% or 25%;

over and above that cost of the plant.

Q. And then the salvage in the plant as well?

A. Some contractors do. In addition to that profit he gets the salvage of the plant as well, and some figure a salvage of 25% on the plant as an additional profit.

Q. In jobs of this kind, what proportion of the total cost of the work would be the cost of the plant?

A. 10% or 15%.

Q. That would be considered a fair proportion?

A. I would say so.

Q. They might get 25% salvage on the cost of the plant?

A. Somewhere about that.

Q. That would depend on the market and the class of the plant? A. Yes, in some classes of plant you have to write them off annually. There is a larger percentage of depreciation than on others..

COMMISSIONER R.A. ROSS: What decrease in efficiency in labor would you estimate during the time this work was going on; say 1920 as compared with 1914. I mean efficiency of labor, not wages? What would men do in the way of turning out work as compared with 1914?

A. If you want to figure the old daily capacity of a man shoveling loose earth, we used to figure where it had not to be thrown very high, say in a wheelbarrow, he would do 12 yards in a ten hour day. If you get four out of a man nowadays, you are doing well.

Q. In addition to that you are paying him nearly three times the amount of wages, so that it might be a question between the wages per unit and the work done per unit of one to five, or six, seven or eight? A. Oh, yes, easily.

TO THE CHAIRMAN:

Q. Are you speaking of common labor? A. Yes. I have seen men on the Welland Canal over here wheeling ~~about~~ broken stone with about two shovels of stone in the barrow.. I know of one case where a foreman asked a man to take his coat off to get a little more efficiency in that way, and the whole gang quit.

Q. Speaking of efficiency as compared with 1913-1914, can you say what the difference would be between the early part of 1919 and the latter part? Would the conditions described by Mr. Ross be the conditions in 1919? A. They would.

COMMISSIONER ROSS: If they made their estimates on 1916 figures, there would not be as much difference?

A. Oh, no.

Q. I suppose it is difficult to say how the proportion bears? A. Yes.

TO THE CHAIRMAN:

Q. Estimates given in 1919 would be given at a time when conditions were about as you described them?

A. Most unusual conditions, and even today a contractor figures that when there is a plentiful supply of labor, he could weed his men out, and the man who was soldiering on the job, he would fire him and put someone else in his place. But the conditions were such that if you tried to do that, the man who took his place would be as bad as the man you fired.

COMMISSIONER R.A. ROSS: And they all work in proportion to the poorest man. .

TO THE CHAIRMAN:

Q. When did conditions as regards labor begin to mend?

A. I do not think they have mended yet.

Q. They are better now? A. Not much. I was just telling the other Commissioners before you came in of a large hotel they were building in Buffalo, the Statler; they are opening it tomorrow. It was commenced about two years ago, when they secured unskilled labor at 30¢ an hour, and they finished up paying that same labor 75¢ an hour. For common labor they were paying; \$8 a day for plasterers when they started, and when they finished up \$12 a day.

A.
There is an increase of 150%. If they were getting unskilled labor for 30¢ an hour in 1921, they were getting it much cheaper than they were getting it before?

A. That was a local condition, and that was only for a short time. They raised to 75¢ in a short time.

Plasterers were making \$108 a week when they finished.

Q. When we built the Electrical Development Power House in 1906, we figured that a bricklayer on ordinary straight work, not many windows or doors, would lay 1500 brick in a day, and that was not unusual, and an industrious fellow would lay 2,000. We are lucky today if we get 800.

MR. FRANCIS: It is 600 in Montreal.

COMMISSIONER HANEY: I had men who laid 2500 brick a day. When we built the shops at Winnipeg, our men mostly laid 2500 brick a day.

TO THE CHAIRMAN:

Q. Speaking about the difficulty of getting any contractor to take this work, would it have been possible to divide it up in sections, letting each section to a contractor?

A. No.

Q. The same conditions would apply? A. Yes, the same argument would apply to the sections as to the entire work.

Q. Would there not have been the possibility if the Commission furnish the plant, to have contractors do the work in sections? A. You might have found some contractors who would, but under the labor conditions it would be difficult.

MR. FRANCIS: I have some information with regard to New York State and perhaps Mr. Larkin may know something about it.

Q. Do you know anything about conditions that existed in New York State when the Government is said to have helped contractors out on their jobs? A. Yes, I know all about it. We had one of these jobs at the time you are referring to. It was canal work and road work.

Q. My information is that the Government helped contractors on account of war conditions when they were on Government jobs? A. They did.

Q. I am trying to see if the engineers of the Hydro appreciated the conditions that were arising in advance, and it has struck me as being interesting, the attitude of the Government of New York State toward contractors who were working for them? A. I know all about that; sometime early in 1918, the New York State Legislature passed the bill called the Walters Bill for the benefit of large canal contractors in New York State. We were then engaged on contracts for the New York State on the Barge Canal. At a later date they passed a bill known as the

Adler Bill. That was the following year and was exactly the same as the Walters Bill but was fathered by a man named Adler, and it was for the assistance of contractors on road construction. At the time the Adler Bill was passed, we had a contract for the construction of a bridge at Oswego. It was a small contract, as I recall it, it amounted to about \$135,000 or \$145,000. The bill read in substance as follows: Owing to the unbelievable conditions that have arisen as a result of war conditions, we feel that it is only fair and moral to the contractors of New York State who have courageously endeavored to continue their operations in the face of these unbelievable conditions, that they should be reimbursed, not to the extent of giving them a profit. And the way they worked it was: it was dated from the date of the declaration of war by the United States, which I think was April 16th, 1917. We were beneficiaries under that Act; it applied to this particular job, and the way they did it was this: They had a firm of accountants from New York; it was not Price-Waterhouse but some well known firm, and they sent auditors around to every contractor and they took his books, and from that date until the completion of his job, they simply added up what he had paid out and what came in, and gave him the difference. We got on that small job a cheque for about \$55,000.

Q. So these difficulties would be well known in 1918 and the beginning of 1919? A. Yes, and that is a situation unique in the construction world. The difficulties were well known at that time.

Q. They were well known in 1918 and 1919? A. No, they did not pass that bill until late in the year of 1918; I may be wrong.

Q. The Legislature adjourns there about May? A. It may have been they did that in 1919; I am not sure.

Q. I understood you to say one was done one year and the other the next? A. I may be wrong; it may have been the following year. Anyway the object was that the State of New York realizing the difficulties of the contractor and the inefficiency of the men, all of which was set forth in the Bill, the object was to help the contractor, and I never heard of that before in the history of the world.

Q. It is not uncommon for a Government where a contractor has met with unexpected difficulties to come to his assistance? A. But not in the form of legislation.

Q. There are limitations in New York State that are not over here where the Government has wider powers than they have under their constitution; at the same time I think we all know of the great difficulties they must have met with? A. Yes, it was well stated "unbelievable".

Q. In connection with the rock and earth excavation on the Chippawa, can you give us any idea of the percentage of labor that would be used, except for the service of the machines, for the operation? A. No, I would not like to answer that question with the class of labor that they employed.

Q. With any class of labor is a very large percentage of the work done by the steam shovel? A. Yes, a very large percentage.

Q. There is not the same amount of common labor used in the actual excavating of the material that there used to be in the old days? A. Oh, no. Machinery was developed with that idea in mind.

Q. That was brought about by the increasing rates for common labor? A. Yes.

Q. Yet there is a certain amount of manual labor that they have not been able to get away from? A. No, in certain locations you can use chutes.

Q. Would the class of labor used on the Chippawa undertaking be better or worse than that used by the average contractor?

A. At the particular time that that labor was employed, there was no choice; it was all about the same.

COMMISSIONER J.A.ROSS: What percentage of skilled and unskilled labor, in the sense you are speaking of, was used on the Chippawa?

MR.FRANCES: I am going into that question now.

COMMISSIONER J.A.ROSS: Unskilled labor might be 80 or 90%.

WITNESS: I would say about 80%.

COMMISSIONER HANEY: You are speaking of labor outside the operating of the different appliances.

WITNESS: The whole works.

COMMISSIONER HANEY: A steam shovel needs a certain number of men to operate it? A. Yes.

Q. This would be unskilled labor I suppose, with the exception of the actual operator? A. The actual operator.

Q. These shovels do the same amount of work right along? A. I suppose so.

MR.FRANCIS: No,they do not. If you look at the figures you will see they do not owing to the conditions.

COMMISSIONER HANEY: Would not that be largely due to the service that was given them and the location in which they were working,and the facilities for getting cars to them,more than the actual operation of the shovel?

MR.LARKIN: I would say largely yes; if you encounter a very bad formation for one month and you have slipping and sliding of the tracks and then you get into a better class, the next month,naturally you would look for an increase.

MR.FRANCIS: It varied all over. I am analyzing that now. None of the shovels ever realized the manufacturers figures.

Q. I was under the impression from the figures you furnished that their output was about the same? A. I think probably it was the conditions that varied rather than the labor.

MR.FRANCIS: It seems to me that was so,leaving strikes and things of that kind out of consideration.

MR.LARKIN: If you have an exceptionally good dumping gang, a snappy gang on one side,and not such a good foreman and gang of men on the other side,the shovel is not going to do as good work.

TO COMMISSIONER HANEY:

Q. In reference to the work of a contractor on schedule, you would determine from month to month the cost of the different items,earth removal and rock removal and so forth?

A. I would.

Q. You would compare that with your contract price?

A. I would.

Q. If it was found* that the cost was exceeding the contract price, what would be the operation that you would pursue in order to correct that? A. I would attempt to determine the particular cause or causes that brought about that condition. If I found it was owing, we will say, to the dump, and the dump foreman and his gang was not good enough to give the service to my steam shovel, I would get rid of the foreman and that gang and put somebody there that would do it, if that was possible, and ordinarily it is possible. At the time this work was done, I am not prepared to say whether it was possible or not; I think you would have to do the best you could.

Q. You would follow it up closely in order to bring your costs down to your contract price? A. I would try to do so.

Q. The contractor would have to watch all angles of the game and see whether the shovel was ready and the dipper properly filled so many times a minute? A. And the length of time it would take them to get to the dump.

The steam shovel might be working properly and the locomotive man taking the train up might not be running as quickly as he should have done; you might find some trouble there and some trouble on the dump. Before the war, if that was found, you would fire the men.

TO THE CHAIRMAN:

Q. You would try to correct it if possible? A. Yes.

Q. Have you ever had a contract from the Federal Government of the United States? A. No.

Q. Have you ever had any from the State Government?

A. Yes, I have had a number from the New York State Government.

Q. Under whose control are these contracts at Albany?

A. The head of the Barge Canal Department is the Superintendent of Public Works, and the highways have a Commissioner.

Q. The highways would not be under the Superintendent of Public Works? A. No.

Q. But the Barge Canal and public works generally would be under his control? A. Yes.

Q. What steps would be taken by the Superintendent of Public Works to find, as work went on, whether or not the work was being done within a certain price?

A. None whatever; it did not interest him. The contractor was bonded with a bonding company.

Q. Take that power canal that is now being built at Niagara, the cost is apparently subject to the supervision of the Federal Government; do you know anything about that?

A. No, I do not.

Q. Is not all the work done in New York State undertaken by the State directly without letting out contracts?

A. None but maintenance. Maintenance of canals and roads they do themselves.

Q. Are the roads built by contract? A. They are built by contract.

Q. Altogether? A. They have a queer method of letting contracts both on the barge canal and on the roads. The engineer's estimate is part and parcel of the contract, each schedule item, for instance concrete.

Q. You mean the State engineers? A. Yes, it is bound in the specifications. We will say concrete may be \$10 a yard,

and the aggregate amount of the entire undertaking might be 40 or 50 items and amount to \$1,600,000. You cannot bid more than 10% on that aggregate.

Q. Over that? A. No, you could not bid more than \$1,400,000, and neither could you bid more than \$12 for the concrete, that is 20% on any one item or 10% on the aggregate; if you do, the bid is informal.

Q. It would not be accepted? A. It would not be accepted; I consider that is a very bad method of letting contracts.

Q. What is the idea? A. To keep within the estimates, and the result is that a man who has not had experience will come along and cut the engineer's estimates, and then not be able to carry out the contract.

Q. You can go as much below that 10% as you like? A. Yes, but that is the limit of the increase.

Q. Are these estimates, as a rule, made with much considerable care? A. They were not in the beginning; they have been latterly, and the result of trying to cut down the cost has resulted in the breaking of 80% of the contracts, easily 80%.

Q. If they do not get any bids within 10% of the engineer's estimates, the work cannot go on? A. No, the bids are informal.

Q. Then they would have to make new estimates? A. They would have to make new estimates. The trouble is the new owner who does not know the game is going to going to out.

COMMISSIONER HANEY: The same as in the old days here, they would get their prices out of the blue book?

A. Yes.

TO THE CHAIRMAN:

Q. They got their experience in that way? A. There is not much use in having experience after the bank roll has gone.

Q. I suppose one contractor might make money at a figure where another contractor would fail? A. Yes.

Q. That is management? A. Yes, and efficiency.

Q. Is that a large factor in the successful and non-successful contractor? A. It is. In normal conditions one contractor would make 20% and another might lose 30%.

Q. What is the object of putting a 10% limit, is that to prevent combinations? A. That, and to keep within the estimates that they prepared.

Q. It would prevent any attempt of contractors to fix the bidding among themselves? A. Everything over there is public letting; the contractors are all in a room and the tenders are opened in their presence and one contractor can take down his competitor's prices.

Q. Do you think that is a desirable practice? A. I do.

Q. The contractors know when the bids will be opened?

A. They know the hour and date when they will be opened. and they are always there or have representative. The whole thing is very democratic, everybody smoking a cigarette or chewing tobacco, everything is open and above board, and there is very keen letting of contracts. We went up there as Canadians and we never got better treatment in our lives.

Q. You got fair treatment? A. Yes.

Q. Did this method continue during the war? A. Yes, and the result was they got no bids for one year; the barge canal work was finished, but the road work, for practically a

one year, received no bids.

Q. When they did get bids, they took the measure you have spoken of to relieve the contractors? A. Yes.

Q. Did they examine your books as the work went on?

A. No, except on the conditions I have stated.

Q. Outside of that? A. No, they have no right to look at a contractor's book. The contractor is bonded by a bonding company, and if he fails, the bonding company has to step in and complete.

Q. What securities do you have to give? A. 10% of the amount of the contract in the form of a bond; if you have \$1,500,000 contract, the bond would be \$150,000; it is worded in such a way that the bonding company have to finish the contract.

COMMISSIONER R.A. ROSS: They have the bonding companies so that they cannot slip out? A. Yes, they are in pretty good shape now; there was a time when that condition did not exist.

TO THE CHAIRMAN:

Q. The bonding company would want a pretty good premium?

A. They got 2½% on the amount of the contract.

Q. They would make a careful estimate before they went on the bond? A. Yes, they do.

---Adjourned until Tuesday next, the 22nd of May, at 11 A.M.

THE HYDRO ELECTRIC INQUIRY COMMISSION.

36 King Street, East, Toronto, May 22nd, 1923.

P r e s e n t:

W.D. GREGORY, Esq.,	Chairman,
M.J. HANEY, Esq.,	Commissioner.
LLOYD HARRIS, Esq.,	Commissioner.
J.A. ROSS, Esq.,	Commissioner.
R.A. ROSS, Esq.,	Commissioner.
J.H.W. BOWERS, Esq.,	Secretary.

CHARLES E. FRASER, called.

TO THE CHAIRMAN:

Q. Where is your office? A. Montreal and New York; our firm is Fraser, Brace & Company.

Q. What contracts have you engaged in during the last ten years? A. Cedar Rapids plant, 30 miles outside of Montreal that is the biggest one and we also built the La Loutre Dam.

Q. What is the cost of the Cedar Rapids? A. That first development was ^{\$10,000,000} ~~\$12,000,000~~ for 100,000 horsepower.

Q. That includes installation and everything? A. Yes, in fact there were \$10,000,000 of bonds, and I guess they got only \$9,000,000 in cash. We did the work of the second development in 1917 to 1918.

Q. Did you supply the machinery? A. No, we did the civil engineering part; excavation, coffer dams, power house and the sub-structures.

Q. When did you take the contract for the Cedar Rapids?

A. April, 1913, and the work went on for 1913 and 1914; and then

we started the dam at La Loutre 50 miles from the Trans-continental Railway.

TO COMMISSIONER HANEY:

Q. Did you build the Cedar Rapids work on schedule or cost plus? A. On fixed prices or unit price. The dam at La Loutre was also unit price; it was a Government contract; we took that under the name of St. Maurice Construction Company.

Q. Re-enforced concrete? A. No, solid concrete, about 75,000 yards. We had to build a railway to get there; transportation to the site was the main problem. We had to build a railway for 30 miles, and 30 miles of river navigation.

Q. It is a fairly level country down there? A. Typical Laurentian country - it is 1300 feet up, the same as they have all over that Laurentian country. After finishing at La Loutre, we built the second Cedars development in 1917-1918.

Q. What was the extent of that? A. About \$2,000,000; that was a cost plus contract taken during the war.

Q. Did you guarantee any fixed price? A. No.

Q. How did you compute your commission? A. We received a fixed amount of about 6% of the estimated cost of the work.

Q. Did you give an estimate and say your fee would not cost more than a certain sum? A. We always do that. It is a fixed percentage of the probable cost, and we take this as a fixed amount; if the work costs more we do not get any more fee.

Q. That is you keep the percentage within control?

A. Yes, if it costs more, we do not get any more.

Q. Do you divide the saving? A. No, we have never done that.

It would mean you would have to keep track of extras and

changes just as if it were a unit price job and that costs a great deal of money. This work was done on cost plus a fixed sum.

Q. What was the fixed sum? A. That varies.

TO THE CHAIRMAN:

Q. You would estimate the cost at so much and then if it exceeds that, you would not make any additional percentage charge? A. That is true; that is another way of saying it.

TO COMMISSIONER R.A.ROSS:

Q. In these contracts they guarantee to the owner no cost at all. They only say, "We will do the work for so much", and if it exceeds a certain figure, they do not get any more, but they do get their fee no matter what it costs, even if it cost ten times as much; and then there is another form of contract whereby if it exceeds the cost price of the estimate, they usually divide the profit with the owner.

COMMISSIONER HANEY: If it is done for less than the fixed price?

COMMISSIONER R.A.ROSS: No, if it costs more, they will give up some of their fee, and if it costs less they will divide the profit.

TO COMMISSIONER HANEY:

Q. You make an estimate of the proposed ultimate cost?

A. We always give an estimate.

Q. You gave an estimate in this case you have spoken of?

A. Yes.

Q. Did you keep within this estimate or not? A. Yes, we were just even with it.

Q. You are speaking now of the second development at Cedars?

A. Yes.

Q. Was that in 1917 to 1918? A. Yes, it was completed 1918.

Q. What other contracts were you interested in, Mr. Fraser?

A. After La Loutre dam - a dam for the International Nickel Company at Turbine; that was built in 1919 to 1920, the principal part of it.

TO COMMISSIONER R.A. ROSS:

Q. That was a dam just above their existing power house?

A. Yes, in very deep water; we have not built the power house yet; we just built the dam which is being used for storage purposes.

Q. You did not build any storage dam on the river up above?

A. No, only some earth dykes.

Q. What is your estimate in this third case? A. In the Turbine job we ran considerably over the estimate, I should say we ran probably \$700,000 over the estimate.

Q. What was the estimate? A. About \$2,250,000, and it cost \$3,000,000.

Q. That would be about 33% over? A. Yes.

TO COMMISSIONER HANEY:

Q. What was the price on concrete? A. We did not have a price.

Q. Your estimated price? A. I do not recall; I have here the form cost and mixing and placing cost; I have no notes of the actual cost. I came here to speak of change in cost.

Q. I am interested in the possibility of making an approximate estimate at that time? A. I told you the general result was we over-ran.

Q. In the first one you did not overrun at all, and in the second one you overran about 33%? A. The biggest job was the first Cedars which we did for the estimate, and the second

Cedars job we also did for the estimate.

Q. What was the amount of the second job? A. \$2,000,000.

Q. You did that for the estimate? A. Yes.

Q. In what period was that done? A. 1917-1918.

Q. Completed in that year? A. Yes, we did that.

Q. Then the third one was where you exceeded the estimate by about 33%? A. Yes. La Loutre was another in 1915-1917 in which we exceeded the estimates.

Q. What was the original estimate? A. A million and a half and it cost two million.

Q. About a third more? A. Yes, and labor went up during that job. We started with labor at \$1.50 a day and it went up to \$3.50 a day.

Q. That would be common labor? A. Yes.

Q. Began at \$1.50 and ended at \$3.50? A. Yes, that started in 1915, and finished in 1917. Labor conditions at that period were very difficult and that made a great increase in the cost, and there was a lessening of efficiency up to 1917.

Q. In this dam that cost \$3,000,000, can you give us any idea of the proportion of the concrete to the total amount of work? A. There was 80,000 yards of concrete in the dam at Turbine and it had a cassion foundation which cost a lot of money.

Q. What is the proportion of the cassion in your dam, would it be 50%? A. The coffer dam being a compressed air job, we did not use it in this comparison, the expense of the compressed air cassion made impossible any comparison with ~~xxx~~ other coffer dam costs. I have here ~~x~~ coffer dam costs showing how they have changed - the first Cedars labor cost of coffer was 64¢ per cubic yard, and the second Cedars

labor cost was \$1.03 per cubic yard.

Q. Was that the ultimate cost? A. That is the average cost for the whole job. At La Loutre it was 95%. The coffer dams then we built rather early in the job before labor had reached the peak. At Chutes aux Galets the cost was \$3.31. This last was a low coffer dam with a lot of sealing as compared with the total bulk of the coffer dam. At Great Falls, Manitoba, the cost was \$1.92 for labor and at Buckingham, it was \$1.45. These are all direct labor costs on coffer dam construction.

Q. You would not have the same proportion of concrete to the other work in this \$3,000,000 job? A. No. Perhaps you have in mind so much per yard of concrete for the whole job.

Q. The whole job at so much a yard for concrete would be \$37 a yard? A. I have not got that; that \$3,000,000 includes compressed air foundation for the dam which was quite an unusual feature, and it rather spoils the comparison. It added very much to the cost of the job. La Loutre was 75,000 yards concrete, \$2,000,000 job; that includes a quarter of a million dollars for the railway to get in there and a temporary power plant.

Q. Your coffer dam and excavations also? A. Yes.

Q. That would be \$25 a yard including all the work? A. Yes.

Q. \$12 a yard cheaper than the compressed air proposition?

A. Yes.

TO THE CHAIRMAN:

Q. I was going to ask you about labor conditions; when did the labor conditions become what you would describe from a contractor's standpoint as bad? A. That happened during the progress of the dam at La Loutre; that was the big change.

Q. That began in 1915? A. We had no troubles in 1915, but in 1916 there was a fight to get anything done.

Q. In 1917? A. We had to pay \$3.50.

Q. Anyone making an estimate in 1917 would make it knowing the labor conditions that existed at that time?

A. Yes, we exceeded our estimate at La Loutre by 33%, but at Cedar Rapids which was done right on the heels of that, we caught the curve there and we estimated correctly and did not exceed our estimates. Then at Turbine we fell behind our estimates again; that was after the Cedars.

Q. Then if you had made an estimate in 1917, would you have figured on labor at what it was at that time? A. Oh, yes.

Q. Making some allowance for additional labor costs?

A. Making some allowance for possible increase. At turbine labor did not get away from us; it was not altogether the wages but we had less efficiency.

Q. That was quite evident to you at that time? A. Yes.

Q. After 1917, did labor continue to grow worse?

A. That statement covers Turbine and continues up to 1919, and then the curve of cost which I have shown you went right on climbing.

Q. When did it reach the peak? A. The peak was in 1920. Chute aux Galets job for Price Brothers ran about one and three-quarter million dollars.

Q. Was the increase of labor in 1917 greater than the increase which had taken place up to 1917 from 1914?

A. No, the big jump in wages happened prior but the loss in efficiency did not seem to hit the La Loutre job, but the cost of the work went on increasing fast.

Q. The principal increase was before 1917? A. Yes.

TO COMMISSIONER J.A. ROSS:

Q. Did you use mostly French Labor on the La Loutre job?

A. Yes, Sir. La Loutre was probably three-quarters French.

Q. That was in Quebec? A. Yes.

Q. Do you know from your own experience in Ontario whether the curves ran parallel? Did the rise in price and cost of common labor in Quebec occur simultaneously and parallel to the rise in Ontario or were there different periods? A. I do not believe I can answer that question competently.

Q. My impression was that the increase in the cost of French common labor and the decrease of efficiency occurred after it took place in Ontario in English labor? A. I could not answer that; I am not sufficiently well informed.

MR. FRANCIS: Mr. Fraser has given us evidence as to contracts not only Ontario and Quebec, but in Manitoba, and he is speaking of the general unsettled conditions. I do not believe there is any comparison to be drawn except he can give us the general unsettled conditions.

MR. FRASER: The largest increase in the price of labor took place before and in 1917, and the cost of work went right on increasing after 1917. In fact it increased a little faster in 1918 and 1919 than it did in 1917 and 1918.

Q. The decrease in efficiency was greater in these later years than in the earlier years? A. Yes.

Q. Generally we find that labor is like water. It gets its level. Labor men are pretty well informed of what wages are in one place and if labor is higher in one place than in another, they go where the labor is highest? A. Yes.

TO COMMISSIONER J.A.ROSS:

Q. That is not true in factory work. You are speaking of construction work? A. Yes.

Q. The cost of common labor in Quebec in factory work is usually lower than it is in Ontario? A. We have much the same men follow us from job to job. All firms that specialize in certain jobs do the same all the way through.

Q. When you are paying labor \$3.00 a day as against \$1.00 a day, common labor will move from job to job? A. Yes.

Q. You would have a great many more men on your pay roll with your high labor prices than you would actually employ?

A. Yes, the turn over is very large. At high rates, the turn over is very large; they hear of some place that is very short of labor and that is paying 50¢ or \$1.00 more, and they go there. The difficult condition in Canada is due to the climate and the urgency to complete the work in the fall, and in any year when there is a fair amount of work going on, there is a great scarcity of labor about August when people begin to see what they have to accomplish before the end of the year. Then they send scouts out on the other fellow's job.

Q. We find that there was a tendency to drift from Chippawa to Montreal for week ends? A. That is likely.

TO COMMISSIONER HARRIS:

Q. In 1917 you estimated on works that you were going to carry on for 1918 and 1919? A. Yes.

Q. Was that Cedar Rapids? A. Yes, we estimated on Cedar Rapids the second in 1917.

Q. You estimated on conditions that you figured were going

to hold through the next two years? A. Yes, the next two seasons.

Q. How much did you exceed these estimates? A. We did not exceed them on the Cedars; we guessed the curve right at that time.

Q. That was 1917 and 1918? A. Yes.

Q. Was 33% the most that cost exceeded the estimates, with you? A. Yes.

Q. That was the highest point you reached? A. Yes.

TO THE CHAIRMAN:

Q. What was your next job? A. The Turbine dam where we put in 80,000 yards of concrete for the International Nickel Company; that was in 1919 and 1920.

Q. When did you make your estimate for that? A. Summer of 1918.

Q. How much was that estimate? A. That estimate was about two and a quarter million.

Q. Did you come within that? A. No, we spent \$3,000,000 there.

Q. How was it you exceeded the estimates? A. Mostly in lack of efficiency in labor. Labor prices did not go very seriously beyond what we had estimated. The increase in labor wages at Turbine as compared with Cedars second was only 5% an hour for common labor, but the efficiency was very poor, and the indirect cost was what hit us the hardest at Turbine. The camp construction cost went up, and we lost on the operation of our camps. Cement went up - everything went up.

TO COMMISSIONER HANEY:

Q. You did not get a fixed price on your cement? A. No. The International Nickel Company itself went into that controversy about cement; we all tried to get a fixed price on cement and

made a fair arrangement for it, but had to pay a pretty big price.

THE CHAIRMAN: When was the contract for the cement made for Chippawa?

MR. FRANCIS: There were several. I could not tell you off hand.

Q. Are you an engineer? A. Yes, I am a graduate of McGill.

Q. What was the next job you undertook? A. Chutes aux Galats which was a comparatively small job for Price Brothers near Saguenay; that exceeded the estimate only in the costs of hauling the material over 20 miles and across the Saguenay River; the 20 miles was over a rather hilly road; that hauling feature exceeded the estimate by 100%.

Q. Aside from the hauling feature you kept within the estimates?

A. Yes.

Q. When was that estimate made? A. In 1919, in the early summer.

TO COMMISSIONER J.A. ROSS:

Q. Were these estimates competitive? A. No.

Q. You had the job tied up? A. Yes.

Q. You simply got your estimates out and gave yourself and your employer some idea of what it was going to cost? A. Yes.

Q. You were not in competition with another firm?

A. No, the only competition was the matter of the fee.

Q. You endeavoured to give as nearly as you could an estimate of what it would cost if you did the work? A. Yes.

TO COMMISSIONER HANEY:

Q. Did you make an estimate or did the owner's engineers make an estimate? A. We always make the estimate.

Q. Would they have engineers who would check your estimates?

A. Yes, in every case.

Their engineer's estimate only applied to generalities.

The consulting engineer on that Chutes aux Galets was Geo. S. Hardy of New York. He knows in general what a plant will cost. He did not go into the details as to just what the stone would cost and just what each item would cost. We sent engineers in and they made an estimate, and we usually say to the owner: This is our estimate, but you had better be prepared to pay so much more, and we point out the hazards of the work.

Q. What was the next job? A. The next job of this character was the Manitoba Power Plant which was started in the fall of 1921 and is not yet quite completed. They are getting power now but the rock excavation and the big dam is still to be completed, and that work is being done within the estimates. We had a slight reduction in the cost of labor during that work.

Q. You had passed the peak at that time? A. Yes, there was a decided drop. Chutes aux Galets was the top of the curve, a little over 140%. Manitoba Power is down to 80%.

Q. That is a considerable drop? A. Yes, a big drop. It is not going any lower; the curve is flat now.

Q. Any one making an estimate in 1920 should be well within their prices as far as labor is concerned? A. Yes, in every feature of the cost it has been reduced since 1920.

TO COMMISSIONER R.A. ROSS:

Q. How do you find the efficiency of labor now as compared with before the war; is it getting back to where it was?

A. Oh, no; they do not do as much. On the other hand we are using machinery more than we used it before, to save labor.

So much is that the case that we are offsetting the cost in that way. We are constantly using more machinery, and the set up of the job costs more because we are making a more elaborate set up to reduce the cost of labor and we are spending more on installation and we use more conveyers and more cranes and things of that kind than we ever did before.

TO THE CHAIRMAN:

Q. How do you know as you go on with your work whether or not you are keeping within your estimates? A. We have a system of estimating in which we show the labor cost for each item of installation, and we know whether we are exceeding the cost or not. We have a price for making forms and a price for setting them up and a price for taking them down and we are constantly checking the cost of the work all the way through the job.

Q. How often do you check the work? A. Every month.

Q. After you begin on your work you know whether the work is being done within your estimates or not? A. Yes, we know whether the installation has been done at the estimated price, and we check up every month to see whether we are holding up to our program and whether our cost is within the estimates.

Q. You have a program? A. Yes, absolutely; we have a program, and we have to sacrifice cost for program every time because time is the big element on a Hydro Electric plant. In this climate if you do not complete in November you have to go over until next July or August, and that means a big loss in interest and incomes, and it is out of all proportion to the extra cost of completing the job on time.

Q. Supposing a large part of your estimate was removal of earth and rock, when you start to move that, would you know every

month whether the unit cost was greater or less than your estimate? A. Yes, every month.

Q. Would the concrete work be the same? A. The same thing.

Q. If you begin a work and plan to have it finished in a certain time, would your object be to get as much of your plant in operation as soon as possible? A. Always - and on the time feature we have not failed. That is a specialty of Hydro Electric work; you must complete the work on time and we have done it in every case. We have a certain amount of work to be completed within each month and season of the job period, and we see that it is done within that time. We estimate the number of cubic yards that have to be put in and the number of men that must be put on that job to get it completed in time; thus we know at the end of the first month whether we are doing the work according to program or not. If we find we are not doing it, we get more men; it may be we find we cannot get any more men at the rate we are paying, and we raise the rate and get the men right then, so that, for instance, the coffer dam will be unwatered at the time it should be unwatered, and the rock excavation started on a certain date, etc., and we must proceed at a certain rate per week with every item. Every time I visit a job or my partners visit the job, we revise the whole program to see whether the job is up to date. Sometimes we have to put in 50% more plant on one item owing to some unforeseen difficulty. We might have to increase the plant or the number of men in order to help out a certain item on the program that is not keeping up with the rest of the job. Our usual object is to get the power house finished as early as possible. Thus there is a given time for the installation of the equipment - the generators and switches

can be put in while we are completing the main dam. Or if it is a big canal, we get the power house out of the way and then finish the canal in time to run the power house. We are now building a new development on the St. Maurice River which will have to be ready for June, 1925. We have to have two units running by that time. We have divided the river in two with coffer dams; we are completing these two units this fall, as far as sub-structure is concerned, and will put the machinery in this winter, and they will be running these units next June while we will be completing the main dam just east of the power house.

TO COMMISSIONER HARRIS:

Q. How big a plant will that be? A. \$ 100,000 h.p.

TO COMMISSIONER HANEY:

Q. Your practice is to force your work at the start and not at the finish? A. Well, of course there are a lot of small things to do at the end.

Q. The factor of safety would justify you in forcing your work a little more at the start? A. Yes, the speed adds to the expense. Our rock excavation costs more than railway rock excavation and earth excavation is the same way; the program is what guides us.

Q. Aside from unforeseen obstacles would it be fair to say you plan to do as large a proportion the first year as the last year? A. No, it does not work quite that way; the bulk of the expense of the work very often takes place the last year, in large concrete structures. The first year's work may be unwatering and the expense would not be so great in proportion. In the installation of coffer dams and unwatering you do not

you do not spend so much money as when you get into the dams and powerhouses and superstructures.

Q. The idea is to get ready so that you can do these things without extra cost at the final completion? A. Yes, and without congestion.

Q. Has your work been confined to coffer dam work, concrete and that sort of thing? A. Yes.

Q. And a moderate amount of excavation? A. First, Cedars was about two million yards of earth and a half million yards of rock.

Q. That was in the excavation and the dam? A. Yes.

Q. It was principally in coffer dams and excavation? A. Yes, we unwatered a stretch of river bottom about two miles long.

TO THE CHAIRMAN:

Q. What did it cost you to remove the earth from the rock?

A. I do not think there is any plain answer to that question. The average cost of the job followed this curve, but on some of the jobs we have a larger ratio of earth than in others. In some cases where the quantity of earth is small, the indirect cost is an enormous feature, and in other cases, earth may be excavated at a uniform rate all through the job. The only figures I have been referring to have been direct costs; the indirect costs run from 40% to 50% more.

Q. Have you any estimate of the cost of your plant as compared with the total cost of the work? A. On this Manitoba job, the total cost was \$8,000,000. The part of the work that we did cost nearly \$3,500,000. That leaves out the permanent equipment and leaves out the cement. We had from \$450,000 to \$500,000 worth of contractors' plant on the job.

Q. 10% to 12%? A. Yes. The Chutes aux Galets total cost was

\$2,750,000, which included cement, and we only used \$150,000 worth of plant on that job.

Q. What about the Turbine for the International Nickel? A. On that job we used \$250,000 worth of plant and the cost was \$3,000,000.

Q. Did you absorb the total cost of plant in the work?

A. No; we absorbed about one half of the cost of the plant on most of these jobs, say 40% to 50%.

Q. You would have 50% salvage? A. Yes.

Q. Sometimes you do not get as much salvage as that?

A. That depends on the nature of the plant we are using.

Q. Do you use the same plant on other work? A. Yes.

Q. If you had to sell it, you would not get 50% salvage?

A. No, unless you waited a good many years and had a good organization for selling it; that is a job by itself.

Q. In your earlier jobs you might make money on your plant because prices were going up? A. Yes, the prices of plant increased.

Q. We want about the proportion of the plant that would be absorbed in each piece of work? A. We expect on a job taking two seasons to get 40% to 50% of the value of the plant; that is the new value - or book value of the plant.

Q. Some of it you might have used on other work before?

A. Yes, but we always have to buy some new plant.

Q. That is a high percentage of salvage?

A. Yes, I think we save our clients money in that respect; if they bought the plant they would not save as much.

COMMISSIONER HANLEY: On the Soo Canal our salvage was about 20%; we sold the plant off as quickly as we could after the work was finished. We absorbed the whole plant in our

costs; the job took four years to complete.

Q. You will never get a four year job now; no matter what the job is; they want you to complete it in two years. .

Q. If you had four years to do a job, could you do it cheaper than if you had to do it in two years? A. Yes, if it was a fairly big job, the indirect cost would be less; the indirect cost of two year job would run 40% and on a four years' job it would be much less.

Q. In your class of work where you build coffer dams, you have to build them during one season and do your work the next season? A. Yes, it is a hard program and it makes the work more expensive than ordinary surface work.

Q. The winter is a handicap in this country? A. Yes, we practically don't make concrete in the winter on big jobs; we do the rock excavation in the winter time.

Q. Do you employ a night shift? A. No, only on one or two particular items.

Q. Why not? A. We find the cost of night work is out of proportion, particularly where you have to use the same tools that are used by another crew in the daytime. A dinkey with one man running it in the day and another one at night, there will be an enormous repair bill, and it is the same with the steam shovel.

Q. What other elements are there against night work? A. The men never get as much work done at night as they do in the daytime except in tunneling when they will do just as much at night as in the daytime. We are very loath to use night shifts on surface work. The dump is not left in particularly good shape and you are very apt to get the cars and locomotives off the

track at night time and you have more accidents.

Q. Are the men inclined to shirk their work at night more than they do in the daytime? A. I do not think it is conscious shirking; the men are not in as good trim at night as they are in the day time; the conditions are against them. If it is raining and you have good camps for the men, you can get a good deal done in wet weather during the day time, but a wet and stormy night, it is almost impossible to get work done.

Q. What would be the proportion between the cost of day work and night work? A. I have not the figures for that.

Q. Your experience has led you not to do night work? A. Yes, we would rather put on more machinery and more men in the day time; we do not figure on night work at all except where we have to do it.

Q. If you were not pinched you would not put on a night shift?

A. No, but very often in drilling in rock work it can be done at night so as to get it ahead.

Q. Is the accommodation for your men important? A. Very important. We spend a great deal of money on the camps; the camps at La Loutre cost \$50,000 and at Turbine they cost about \$80,000.

When we want a sober class of men we have to make these fellows comfortable.

Q. How about feeding them? A. They get the best of everything.

Q. Do you charge them so much for board? A. Yes, the average for a number of years has been \$1.00 a day; it was as high as \$1.25 and it was as low as 80¢. During a period of scarcity of labor, we find it pays to lose a little money on the camps, and we often run the camps ourselves in preference to letting them to boarding house people. The expenditure of 15¢ a day on a man in the camp will sometimes accomplish more than raising the

wages 50¢ or 60¢

Q. If your food was poor and your camps full of insects, would that have a serious effect on the quality of your force?

A. Yes, indeed it would have an immediate effect.

Q. How about the efficiency of the skilled labor during this period; your hoist runners and shovel runners and engine runners? A. I guess we get more work out of a steam shovel now than we did ten years ago; we work them a little more closely.

Q. What kind of shovels do you use? A. The Marion and the Bucyrus, 60 to 80 tons; then we have small steam shovels on most of the jobs. We get more per day out of rock drilling than we did ten years ago.

Q. You use air? A. Yes, and we spend more on the tools and on tool repairs.

TO COMMISSIONER R.A.ROSS:

Q. Have you tried electric drilling? A. We have tried it, but we cannot get a big enough motor on the drill. We can do more by putting through 150 feet of compressed air. Aside from rock drills most of our plant is electrical; three-quarters of our plant is electrical. That is our contractor's plant.

Q. Your shovels are not electric? A. No, the shovels and dinkies are steam; the mixers and crushers and derricks and pumps are all electric.

Q. What would be the difference in result as between steam shovels and electric shovels? A. The first cost is very high on the electric shovel; we have never used one.

Q. You have never tried them out? A. No, we are not rich enough to buy one.

Q. The cost is nearly as five to one? A. All of that.

Q. Is the increase efficiency of the electric shovel more than counterbalanced by the increased cost? A. The investment is too great for us and we never tried one. We could not face that investment so I do not personally know what the saving would be. I know about electric hoists and engines, and the salvage is much greater on an electric plant than it is on a steam plant.

Q. That is small plant that you can dispose of? A. Yes, they last much longer and there is very little depreciation.

Q. Are steam shovels very efficient at the present time; very little breakdown? A. Steam shovels have not changed much in ten years.

Q. They have not changed much in 40 years? A. There is quite a change in size and many improvements in design previous to 1910.

Q. What would your comment be as to the relative cost of steam and electric shovels? A. I have never used an electric shovel.

Q. What would you say as to the type of steam shovel used by Hydro? A. Here is a 65 ton shovel, 2½ yard bucket, that cost \$9,000; that was bought in September, 1917; that was a very low price; a very low price. Steam shovel prices did not jump as quick as the others. Electric shovels about the same weight cost \$15,000; I should think if you said an electric shovel cost twice as much as the steam shovel that would be about right.

Q. Would the price paid for steam shovels be high in your opinion? A. I would not express an opinion on that without making a close study of it.

Q. I think we were told by the engineers that they ordered these shovels some time before the rise took place? A. Some of them they certainly did, because there is a steam shovel, 65 ton for \$9,000. I do not think you could ever have bought that type of shovel for less than \$9,000 in Canada. I have not much doubt they were up to \$20,000 by 1920.

TO COMMISSIONER HANEY:

Q. You do not know whether in actual operation a 70 ton electric shovel would take any more earth or swing any oftener than a steam shovel? A. I do not know.

Q. Do you know how many swings per minute you can get out of a steam shovel? A. No, I carry it in yards per day rather than swings.

Q. You can get three a minute in good digging? A. I did not know.

Q. And the big shovel they had there gave them one swing a minute; of course it was lifting three or four times the height and had an eight yard bucket? A. It was slower operation.

Q. On page 131 of the report of Mr. Francis, you see a piece of work $8\frac{3}{4}$ miles long, and there is about 9,000,000 yards of earth on top of 4,000,000 yards of rock. You have already said that the coffer dam is one of the first things to be attacked? A. Yes.

Q. In looking over that profile, what would you consider the chief governing factor in taking out that excavation, having in mind that there is nine million yards of earth and four million yards of rock? A. I do not know that I understand the question. There is simply a great mass of excavation

and many times

it is very hard to find the right words

especially in the case of a person

who is not a native speaker of the language

and who has to learn the language from scratch

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and the programme on it would call for the installation of a very extensive plant, and securing very ample dump accommodation.

Q. In Mr. Francis' report at page J.11, the whole works are shown from Niagara River clean through to the Welland River, and showing in the heavy black line, the canal; it also shows the principal disposal grounds, one of which was at the two mile post, and the other at the six mile post, and that is where they put the bulk of the material. The low point referred to before is the gully shown opposite the Whirlpool and is represented by a thickening of the line, and that is between mile post 6 and 7? A. What does that make the average haul? How much of a haul did they have?

Q. To the main disposal area the average haul would be about four miles, and the maximum haul would be the difference from the disposal ground and six miles down from the river?

MR. FRANCIS: The material from mile post 1 and 2. came into the disposal area opposite mile post 2.

COMMISSIONER HANEY: They might have taken practically the whole of the material to St. Davids, and that would be on a down grade.

MR. FRANCIS: I am speaking of what was done. The height of ground was approximately opposite third mile post, that was the hogback.

COMMISSIONER HANEY: The advantage of taking it to St. Davids was that it was down grade, whereas the disposal area opposite mile post 2 was on a 1% upgrade; it was all on a temporary trestle.

MR. FRANCIS: It might be well for Mr. Fraser to look at the map so as to get a better idea of where these disposal areas were located. H.25 shows the amount taken to Lundy's Lane, and that was approximately two million and a half cubic yards of earth, and a million and one-third cubic yards of rock. The larger area marked P. in the table received about five million yards of earth and about a million and an eighth yards of rock. Then in the disposal area, where the thickened line is opposite the Whirlpool, they put in a million and a half yards of earth and a half million yards of rock. That is where the major quantities were actually deposited.

TO COMMISSIONER HANLY:

Q. The question is the method that you would adopt to take this excavation out in three years; that is nine million yards of earth overlying four million yards of rock?

A. That calls for a pretty large study; they used an excavation unit there larger than we have ever been able to afford.

Q. What would you do as a contractor on the question of the practicability of these large units; I don't think they are economic or practical? A. Well, in canal work the expense of climbing out of the canal is a very large one, and these machines which would land the material away up on the bank looked very good to avoid these inclines for climbing out, if it is soft ground and slippery.

Q. You have practically nine miles where you do not have to climb out, and with a very large percentage of the rock there is no climb at all? A. Don't you have some climb?

Q. There is very little climb? A. Would not you have to make a climb in order to take it out at a sufficient number of places at once?

Q. You would have a down grade until you strike this level?

A. What output did the shovels actually get per month?

Q. I think with these big shovels they got as high as 78,000 yards per month? A. Is that in one shift of ten hours?

Q. Yes? A. That is a small output for that class of shovel. We have under similar conditions taken out 45,000 yards of clay in a ten hour shift with a seventy ton Bucyrus shovel, that is on Hydro Electric work.

Q. Here is miles of stripping, I want to get at the proper method of stripping this off; assuming that your shovels would remove 50,000 yards of earth a month and you had ten shovels that would be 500,000 yards a month, if you had proper track service and trestles and proper dumping ground? A. And big cars.

Q. Twenty yard cars, and plenty of cars? A. Yes.

Q. They could easily do that? A. We never average that much.

Q. You did not have big cars and you had dinkey engines?

A. Yes.

Q. Supposing you had 50 ton engines and 20 yard cars. The idea is to remove 500,000^{a month} and there was nine million yards of earth to remove. The Power House was an important point. Bowerman's Cove, on account of the fill to be made there was another important point. Then up at the peak would be another important point, they should have tackled the job of removing that earth. In order to do the work properly the whole of the earth stripping should have

been taken off. Would you conclude that that would be a reasonable thing to do? A. There is no doubt you would want to get the earth out of the way so as to get at the rock as soon as possible.

Q. And then attack the rock at various points? A. From every point that you could get in.

Q. You say that would be the policy to attack the rock from every available point after the earth had been removed?

A. Yes, this is a very short study of a very difficult problem. I would not estimate the shovels in earth at more than 40,000 yards per month, and that is assuming that you have a dry bottom and good train service, and nothing that requires blasting or shaking up in any way.

Q. They found at the surface of the rock some quicksand. I happened to be there and saw the operation at the point where they had some trouble in that way. They had to work their shovels on pontoons. By taking off this earth first they would have had drainage? A. Some soils will not drain sufficiently so that you will have a good bottom that you can work with a steam shovel on it.

Q. Generally speaking were they moving 80,000 yards?

MR. FRANCIS: Electric shovel #8 did 161,000 yards in October 1920 and it did 121,000 yards in January 1921 and 102,000 in August, 1920. These are pretty high figures; there are other figures running 70,000, 60,000, 50,000 and 30,000 per month. Electric Shovel #2 did 155,000 in January and in June 100,000.

Q. Can you give the output for a year of one of the big shovels?

MR.FRANCIS: Shovel #1. in 1918 did a half million yards.

MR.FRASER: Did they work right ahead till the completion of the work?

MR.FRANCIS: Yes, they worked on the rock after they stripped the earth for a couple of miles ahead. Some of the records made by some of the shovels are marvellous, but they could not keep them up.

MR.FRASER: I would like to see how they got into these earth cuts?

MR.FRANCIS: Generally speaking the service tracks were on the surface, and the shovel down in the excavation.

MR.FRASER: What was the width of the cut?

MR.FRANCIS: It would be probably 70 feet at the toe of the earth cut.

MR.FRASER: It is a hard comparison to make; if you had standard shovels they would have been sinking only ten feet at a cut. You might go down twelve feet after the first cut, but the average would be ten feet. I have no figure in my mind as to what proportion of the 9,000,000 yards would be in 30 foot cuts; would there be 25% of it?

COMMISSIONER HANEY: No, I do not think so.

MR.FRASER: In order to give an estimate it would be necessary to sit down and figure out, some of the work would not include any sinking at all. These shovels hoisted your material an extra 40 feet.

COMMISSIONER HANEY: In the earth work they had to bring their cars within reach of the shovels, and in many cases it was necessary to build a temporary crib to

prevent the slope from sliding.

MR.FRASER: That is a problem in designing a very big shovel.

Q. Looking at the profile you will see there is a very deep cut; as I have stated before there is 9,000,000 yards of earth over the whole of this work. Do you consider that Lundy's Lane would be the point where this work should be forced, and attack that point as quickly as possible? A. With ordinary shovels yes, but when you are planning to buy shovels to take that out in one cut that might be different. Your big shovel had to have two lifts there for a distance of two miles. I think I might have started an independent operation there. Did they do that?

Q. No, they did not reach that until March 1921.

MR.FRANCIS: They took the earth off the summit in September, 1919.

COMMISSIONER HANEY: They had not reached the rock, and it is the rock they wanted to reach.

THE CHAIRMAN: They planned to do the work within three years.

COMMISSIONER HANEY: I want Mr.Fraser's judgment on that point? A. That is the biggest excavation job that has been done in this country; I think I would require several men to help me and we would have to study that for a week before I could give you an answer.

THE CHAIRMAN: The three years within which they had to complete the work was up in 1920? A. We have never exceeded the time that we laid out on a Hydro-Electric job.

MR.FRANCIS: There was a deepening and widening of the canal. It is a question of what they set out to do in

three years, and what they did in four years.

THE CHAIRMAN: They sent out to build this canal at the same size it was built.

MR. FRANCIS: In the second plan they largely increased the size of the canal.

THE CHAIRMAN: They reported to the Government they would be able to do it in three years and they planned accordingly, and it was a canal of the same size.

MR. FRANCIS: That is not my information.

COMMISSIONER HANEY: The building of the trestles and getting the tracks ready would be a big contract in itself. If they did that and got ready for operation in a year it would be a good work? A. I would have divided the quantity into two years; if they had three years to do this work, I would have taken two years for actual shovel work, one year cleaning up and getting ready, and two years for doing the work. I would base the shovel programme on two years.

Q. Would it be practical to complete the work in three years? A. I don't see anything to stop it if you want to spend enough money on the plant.

Q. Without extraordinary expenditure? A. It is unusual, it is away beyond anything else that has been done, to do that thirteen miles of canal in three years.

MR. FRANCIS: The thing they said they would build in three years is not the canal they built; one change involved 281,000 yards of excavation.

TO COMMISSIONER R.A. ROSS:

Q. You were not asked to submit a proposal for this?

A. I don't remember. We did not submit one.

TO COMMISSIONER HARRIS:

Q. Would you have submitted a proposal on a fixed price, if you had been asked? A. We did write the Commission asking for an opportunity to submit a fee tender; we would not have put a fixed price on it ; it would have been cost plus.

Q. A fixed compensation to yourselves? A. Yes, I think I stated that in my letter asking for a chance to bid.

TO COMMISSIONER R.A.ROSS:

Q. What has been the relative efficiency of labor during 1913 to '17 and '17 to '20 and '19 to '22? Labor had a certain efficiency that we recognized in 1914; what was the change in the following years? A.. During 1916 and 1917 we still had good efficiency, we had a limited efficiency in 1917 and we lost it constantly up to 1920 and we regained it in '21 and '22.

Q. Not the early part of 1921? A. Yes, 1921 was good in labor conditions.

Q. Then they began to get the idea that they had to work for a living? A. Yes, in 1921 they got back to something like 1916.

Q. What do you say as to the efficiency of labor in these times? A. There was more work doing, and we had to use men who were not good labourers; it was not the same men becoming inefficient, it was using less efficient men for the same purpose.

Q. Then you had to train new men, and the men were coming and going? A. In 1917 we had to go so hard after labor that we brought in men who had never been in camp before,

and after two weeks they would get sick, they could not stand the heavy work. They tried the work because wages were so high, 40¢ per hour, and that began to pull men from other work, but only one third of them could stand the work.

MR. FRANCIS: Would you be surprised to know that 26,000 men actually passed through the work at Chippawa? Eight thousand was the largest number they ever had working at one time? A. No, that would not surprise me. They would get a more rapid turn over in a place like that that was easy of access. Our work was more remote and we took more pains in taking them in, we saw that they were men who would be likely to stay. Where they could step off a train and take a job they would be more likely to have a larger turnover.

Q. All that affects the cost? A. Yes, very much; I don't know whether I could prepare a figure of the percentage of that.

Q. Would you say labour was fifty per cent. efficient as compared with 1914? A. In 1913 we had what you call efficiency, that is the starting point; we were paying \$1.75 at that time and in 1920, the extreme cost we were paying \$5. At that time we were paying more for installation and using more machines, we were doing everything we could to minimize labour and still our cost was \$2.20 for every dollar we spent in 1913.

Q. We have a difficult problem, we want to find out where this money has gone. \$62,000,000 was spent up to last March, there has been some leak. It will cost \$80,000,000 before it is finished. You have the increase in the cost of labour and the inefficiency of labour, Another factor which enters

into it is the speeding up of the work to get power in September 1921; they did not as a matter of fact get power until December. We are trying to get factors which would indicate the difference between what it actually cost; something to show whether there was inefficiency in handling it? A. It is going to be hard, to work out a curve showing inefficiency of labour, all I can give you is the number of labourers that it took to put in 100 yards of concrete irrespective of the price we paid for labour, and the number of carpenters that it took to build so many thousand feet of forms at the different periods. I could put on a man to dig that information out for you. I am not prepared to answer it, because the fact is we have changed our methods due to the scarcity of labour during this period, and we are constantly increasing the use of machinery. One of the problems we have to face in estimating hydro-electric work is that when we give a man an estimate showing that his work is going to cost say \$5,000,000 with a possible overrun of \$500,000 more, that man will probably find some fellow who will tell him that it can be done for \$3,250,000; so he goes on with the work and finds it costs him perhaps \$6,500,000.

TO COMMISSIONER HANEY:

Q. To serve a steam shovel or drill or hoist, irrespective of efficiency, would it take any more men? A. The same number of men will serve a steam shovel as formerly, but it takes many more on the dump.

Q. That is, of course, regulated by slides and removing of the track? A. Yes. I can put a man on to dig out all that information for you, we have never dug out that

information before.

Q. Dig it out for us, and we will be much obliged?

A. I will do that, following approximately the plan used in making this curve, and we can make it follow the same jobs.

TO COMMISSIONER R.A.ROSS:

Q. What about placing firm contracts from 1916 to 1920, did you find any difficulty in getting advance contracts for material and machinery and so on? A. Oh, yes, the whole situation stiffened up, they refused to quote far more than a very limited period ahead.

Q. When did that begin? A. '17, we didn't have much trouble up to '17 and then they began to fall down on it - later on the supply men often failed to deliver after contracting to do so.

TO COMMISSIONER HANEY:

Q. Starting in the beginning of 1917, do you think sufficient plant could be constructed there to do this work, steam shovels and cars and rails? A. I think so, I do not think there was anything impossible in this matter, I do not see anything impossible about it.

Q. What about cement and sand? A. Niagara is not a good place for sand.

Q. They had no difficulty in getting sand, the sand did not cost them an excessive price? A. Of course, they had the stone right there, they took it out of the excavation and ground it up. I do not think it was an impossible job to do at the time.

TO COMMISSIONER R.A.ROSS:

Q. Could you have contracted for the cement for this whole job in 1917? A. I do not know how many yards of concrete

there are in the job.

TO COMMISSIONER HANEY:

Q. Supposing there were 100,000 yards or 200,000 yards, you would not have any difficulty in contracting for 200,000 barrels of cement? A. On the Turbine job that I told you about there was 100,000 barrels in that job. The Cement Company once or twice rationed us - they were pinched - but we always got the cement.

TO COMMISSIONER R.A.ROSS:

Q. What is your opinion of a Commission or Government undertaking to do work of the nature involved at the Chippawa Development under normal conditions and under conditions prevailing in 1916 to '21? A. I do not know whether it would be a direct answer to that question to say that the basis of our business is that we can building cheaper than the owner. Even if the owner selected the same men to do the work we could ~~beat~~ his cost by reason of our individual attention and experience. The larger the owner's executive organization is, the more expensive his work will be , because it takes him too long to get a decision.

TO THE CHAIRMAN:

Q. You have an experienced and efficient staff? A. Yes,, and we then have a programme on which we set down the dates on which we must get decisions as to various matters from the owner and if he does not give it to us at that time we serve a pretty elaborate notice on him that he is delaying the work right there. The bigger the work the more difficult it is to get decisions at the dates that we should have them.

TO MR. BOWERS:

Q. They used half a million barrels of cement on the job in

four years? A. In that case they were not using cement any faster than we were.

Q. Half a million barrels of cement is not a big order?

Q. I think we use more cement than anybody else in Canada.

TO THE CHAIRMAN:

Q. Were you using cement at the same rate during this period?

A. Yes.

Q. When you say you could ^{do} it cheaper than the owners, do you refer to doing it at cost plus as well as doing it by contract at a fixed rate? A. Yes, the bulk of our work is cost plus a fixed fee.

Q. Have you done any contract work at a fixed sum since the war? A. No, not Hydro Electric work.

Q. Are conditions stable enough at the present time for you to take a direct contract? A. No, we are refusing to do it, we won't do it on Hydro electric but we are doing it on other things, that is, some things that can be finished up in say six months.

Q. How would the cost of construction of this Chippawa work, if you had taken a contract to do it at cost plus with your organization, compare with the cost of the work as done by the Hydro itself? A. I do not know anything about the cost of Hydro work.

Q. You would only give a very general answer to that?

A. Yes.

TO COMMISSIONER HANEY:

Q. The cost of rock excavation was about \$3.80 a yard and the earth excavation 70¢ a yard? A. We got 45¢ for our earth work at the Cedars and about \$1.17 for the rock.

Q. That was in cofferdam work? A. Yes, that was all under water level, the bottom of it was under the water level and we made money on it, that was at a fixed price, but that was in the year 1913 and 14.

TO THE CHAIRMAN:

Q. What did it get to? A. Our peak was three times the 1913 prices.

TO COMMISSIONER HANEY:

Q. What class of rock was that? A. Granite.

Q. That is worth twice as much as the other? A. Yes, the Cedar Power House was not Limestone, it was fairly hard stuff.

Q. What did you say it cost to get out granite rock?

A. We got as high as \$3.50.

Q. What would the cost of taking out granite be as compared with taking out the rock at Chippawa? A. The Chippawa rock would be much cheaper, it is limestone and some shale.

We worked in shale at one time and we did not have to sharpen our tools at all.

Q. What they did at Chippawa as to drill the holes as close to the line as possible and put them three feet apart along the line and shoot them off, that shot the body of the rock?

A. In shale we do not put the holes on the line we put them inside the line and it will break back.

TO COMMISSIONER R.A.ROSS:

Q. Does not it require more powder to remove shale than rock? A. No, you use a slower powder.

TO THE CHAIRMAN:

Q. Would the cost of granite be double or two-thirds or three-quarters the cost of getting out rock at Chippawa?

A. I could not answer that question, it is too wide, I could not make an estimate.

Q. What proportion would limestone bear to granite?

A. On the same kind of cut I should say granite would be perhaps 3% more. Of course, limestone varies very much, you get some very hard limestone. We have hard limestone at Montreal.

TO COMMISSIONER J.A.ROSS:

Q. Did you see the Queenston Canal at any time when it was being dug out? A. No.

TO THE CHAIRMAN:

Q. You did not give us the price for earth excavation in later years? A. The figures for getting out earth are not so good for purposes of comparison. The cost of getting out earth multiplied by two and a half times, from 1914 to 1920; it cost 35¢ in 1913-14 and 85¢ in 1920.

Q. Could you give the cost during the intervening years?

A. The increase of cost on earth excavation follows that curve and it came down very sharply after 1920.

Q. It practically went up at the rate shown on the curve?

A. Yes.

MR.FRANCIS: The rate he is talking of included not only direct cost but indirect cost.

THE WITNESS: The prices I have given per yard are contractors' cost.

Q. That would be your entire cost? A. Yes.

Q. That would include the contractors' overhead? A. Everything.

Q. It would not include the disposal of the earth by the contractor? A. Yes.

Q. And would it also include the plant cost? A. Yes, that

price of 45¢ at Cedar Rapids for earth excavation was the actual price we received.

Q. It would not include interest? A. No.

MR. FRANCIS: Mr. Fraser is not talking about owners' cost, but the contractors' cost.

TO THE CHAIRMAN:

Q. The cost of earth excavation during these years would be practically the same as shown on this curve? A. Yes.

TO MR. BOWERS:

Q. Your prices include contractors' profit? A. Yes, we include the fee.

Q. Have you had any experience in dredging? A. No, we have not done any dredging in Canada since 1911.

Q. What about mass concrete? A. The cost of placing concrete depends very largely on how much money you spend getting ready to put the concrete in. As the price of labor increased we spent more money in getting ready to put the concrete in. At the Cedar Rapids job we spent about 40¢ a yard on preparatory work but on jobs since that time we have spent as high as 80¢ and \$1.00 a yard for the same purpose.

Q. What would the ultimate cost be comparing the one with the other? A. Mixing and placing at Cedars was only 39¢, at Cedars No. 2 it averaged 66¢, at La Loutre 67¢, Turbine 70¢. At Turbine we ran away over our estimate but still the cost of mixing and placing was only three or four cents higher than the cost at La Loutre but the installation cost was much higher, that is not included in this table. Then at Chutes aux Galets, which was a smaller job, where we could not

afford an expensive installation, the mixing and placing cost \$1.35 on an average, that was in 1920 and was three times what it was in 1913. It jumped to three times because we could not make a better installation to help out the labor cost. At Great Falls where we are working at the present time the cost is down to 61¢; it was 61¢ in 1916 and is now back to 61¢ in 1921.

TO COMMISSIONER R.A.ROSS:

Q. The cost of labor on a job of concrete went up three times higher than it was in 1914 in spite of everything you could do to keep it down by increasing your plant?

A. No, that figure of three times the cost was on a comparatively small job and at the peak of labor prices - where the installation was not elaborate.

TO THE CHAIRMAN:

Q. How much did the cost go up from January, 1917? A. From January, 1917, to the top I guess there was an increase of 40%.

Q. Would 1919 be about the peak? A. Yes, we were at the peak practically in April, 1919.

TO COMMISSIONER J.A.ROSS:

Q. When did it begin to drop? A. It did not drop until pretty well on in 1920, in '21 it was away down. Work began to drop off in the middle of 1920.

TO THE CHAIRMAN:

Q. How far were prices below the peak between April and January, 1919? A. We show them here to be climbing in that year 10% or 11% higher than the 1918 prices.

Q. They rose 10% in 1919? A. Yes.

Q. That would be the limit? A. I have an irregularity in the curve there, that is probably a little below the truth, there would be at least 14% of a rise for that year, 1919.

Q. That is for the whole year? A. Yes.

Q. What is the difference in the cost of construction in your system and the cost of construction by Hydro?

A. That would require some consideration.

Q. You say you could construct for less than the owner, why?

A. In the first place we do something that an ordinary engineer does not do. We modify the plans of the structures to fit the construction difficulties. Sometimes we can make a plan and point out one item which would cost out of all proportion because it can hardly be done in the time. Sometimes a change in the location of the power house from one side of the river to the other will save a year in construction time.

Q. Could not all that be done by the owner? A. No, the designing engineer does not usually know about construction difficulties and cofferdams, that is another field. We take his design after he is through with it and suggest alterations.

Q. You fill that other field? A. Yes, it is construction engineering. I am a civil engineer, I graduated in 1899. I know the principles of designing but I have spent all my life in building these things. Practical construction is another problem. The building is different from the designing.

Q. A man might be a very successful designer and yet fall down on construction work altogether? A. Yes, he might not necessarily know anything about it.

Q. How does he get these qualities for construction work?

A. It is a matter of experience and it takes a different type of men.

Q. You have something more than the engineer, you have the experience and special training for carrying on of construction work? A. Yes, we have such men, we have eight men that can manage jobs of this nature.

Q. Are they generally engineers? A. I should say 50-50. Sometimes we have practical men who have grown up from the ranks, but we always supervise the work personally.

Q. You must have a good staff when you came through the war without exceeding the time estimates? A. That is our particular work to make such estimates.

Q. We were told that in making estimates for this work the Hydro engineers allowed a margin for labor troubles of 25% over and above the cost? A. We never put on a flat figure like that. We really estimate each contingency separately. We have labour cost estimated for each item and we say that if this labour cost be increased to such a rate then the work will cost so much more. We don't put a flat figure for contingencies at the end, that would be guessing.

Q. If the Hydro Commission had called you in before they began their construction work and told you the time in which they wished to do it could you have given them a working plan by which they could have finished it in time?

A. Oh, yes, we have not failed in any power jobs and they are quite comparable. We had eight shovels working at one time in Cedars and I think ten ordinary shovels would have done the earth work at Chippawa. It would require another batch of shovels to do the rock or the

earth shovels might have been used for the rock work later.

TO COMMISSIONER HANEY:

Q. What is the proper time to begin rushing a rush job?

A. Right from the beginning.

Q. There was a great deal of work done in 1920? A. That was unfortunate because it was the worst year for costs.

Q. Is not there some difficulty with labour when it is known that your object is to rush the work at the finish, rather than carry it on on a level plane? A. We do not find that in this type of work.

TO COMMISSIONER HARRIS:

Q. If you had an estimate in 1917 on a job and if you knew the conditions that existed and if you had estimated in the beginning of the year that job would cost \$13,000,000 and at the end of the year you revised the estimate and made it practically double that and if you then said this takes in everything and is absolutely safe and then when you completed you found you were 200% above that figure, what would you think of yourself as an engineer? A. I do not know, we did not do this job and jobs are all different; generalities are one thing and what another fellow should have done is not fair to ask of us.

Q. We would like to find out where the mistakes were made and what was done that should not have been done to increase the cost of this work to such a large extent? A. I would suggest that the preliminary estimates must have been too low, the increases in cost of doing work don't account for all that difference. The prices for the Welland Canal work were too low. I made an estimate on the work

and I consider that the prices at which the work was let were too low. A big job does not necessarily cost less per yard than a small one - because you have nine millionx yards you are not going to take it out for less than if you only had to take out three million.

TO COMMISSIONER HANEY:

Q. They estimated that the rock cutting would cost 85¢ a yard in 1917? A. That was too low.

Q. And that the earth excavation would cost 26¢?

A. That was too low, I would say from my experience that it would^{be}/quite impossible to do either of these things at that date.

Q. Would you have made any estimate of that kind? A. No, because I know it could not be done.

Q. You would have said nearer \$2? A. For the rock, yes.

Q. What would you have said for the earth? A. A huge quantity like this in 1917 taking chances of running over three years, I am not sure how high my ideas had gone in 1917; I know that in 1919 I would have said \$1. I could look it up and tell you what we were estimating at in 1917.

Q. Can you tell me what you were estimating at in 1919?

A. In 1919 I would have said \$1 for earth; I am thinking of a particular estimate I made in 1919 which was about 600,000 yards of earth, that is comparable in a way because we could not tackle it except in one place.

---Adjourned at 2 p.m. until 3:30 p.m.

RESUMED AT 3:30 P.M.

TO COMMISSIONER HANEY:

Q. Up to the time of the strike they evidently must have worked with a force of approximately two thousand men, then they had a strike and they put on a night force and they increased their working force to eight thousand men and I presume they increased their plant. Then they dropped the night force and dropped back to three thousand men. I cannot understand what they did with these five thousand men, assuming they did work a night gang? A. They were running night shifts on the shovels.

Q. It gave them a factor of safety on the question of time? A. And then there are four months of the year that work can be done much cheaper than at other times.

Q. Can you tell where all these additional men could be economically employed; they said they did not need as many on the night shift as on the day shift? A. They generally have less men on the night shift.

Q. In order to do \$30,000,000 worth of work they spent \$17,000,000 in plant, what do you say as to that? A. That is a much larger amount than we ever spent, a much larger proportion.

Q. That was due to not getting the plant soon enough?

A. We have sometimes had to put in another shovel or three or four dinkeys or two or three trains of cars to keep up to programme.

TO COMMISSIONER R.A.ROSS:

\$17,000,000

Q. That includes the housing for the men? A. for contractors machinery. If that includes the buildings you will have to take that off. We do not include the buildings

and structures in plant cost, we include the mixers and things of that kind when we talk about contracting machinery and we keep the installation cost separate.

MR. FRANCIS: That \$17,000,000 includes \$2,200,000 for temporary buildings.

TO THE CHAIRMAN:

Q. What have you to say about working at the peak first?

A. Looking at the diagram showing the percentage of earth and rock excavated each month throughout the progress of the work, I would say the output in the early months was too small considering the total work to be done in the time.

Q. How would you have gone about it? A. We would have had to have made much better progress the first year. Their first year of earth excavation was away short and the rock excavation started too late.

Q. Do you mean the rock excavation started too late in order to do the work most economically? A. Yes. From my very Brief examination of the profiles it looks as if an independent start could have been made on both sides of the high cut at about mileage three.

TO COMMISSIONER HANEY:

Q. They did a lot of work after they did get started?

A. And I believe it was beautifully done but they did not start soon enough.

Q. There is no doubt the work was well done? A. Everybody that did work in 1920 had some regrets about the cost afterwards.

Q. If they had adopted another progress programme they would have had a much larger percentage of the work done before the prices went up? A. Yes, but that was something that

would have been hard to foresee.

TO COMMISSIONER R.A.ROSS:

Q. What is your idea about costs after the war? We were all looking forward when the war was over that prices would come down, would you not expect them to come down quickly after the war? A. Yes.

Q. And yet the peak did not occur until 1920, two years after?

A. We anticipated a drop when the war ended.

TO THE CHAIRMAN:

Q. Assuming that \$9,000,000 worth of plant have been absorbed into \$27,000,000 worth of work of development, what have you to say? A. Is the \$9,000,000 part of the \$27,000,000?

Q. No, that is not part of the \$27,000,000? A. Well, then, one-third of your cost on the work was for contractors machinery.

Q. No, one-quarter of the whole thing? A. Does the \$36,000,000 include water wheels and generators and switches?

Q. No, structures and the canal? A. Well, to compare that with the Cedar Rapids which was built in 1913 at \$4,000,000, we had \$400,000 worth of machinery, that is 10%. At Great Falls we had \$600,000 worth of machinery for \$4,000,000 worth of work, which was 15%. At Turbine we had about \$300,000 worth of machinery for \$3,000,000 worth of work, 10%.

Q. The \$300,000 was included in the \$3,000,000? A. Yes, the work at Turbine was done in 1919.

TO MR. BOWERS:

Q. When you speak of \$600,000 for the plant are you taking out of that the salvage? A. No.

Q. We are taking the salvage off? A. It is so small.

Q. It is \$2,500,000? A. Your salvage is small..

Q. If you take off 40% or 50% for salvage your percentage would be off? A. Yes, you would have to make this \$11,500,000 because you would not get as much salvage on this special plant as we would get out of our machinery plant, to really make a comparison you would have to say you spent \$11,500,000 for \$48,000,000 worth of work.

Q. That is just about 30%? A. That is high according to our experience, higher than we ever experienced by twice, 15% is the highest we have gone.

Q. You say the salvage of this plant is low? A. Yes, our salvage would run 50%, it never runs less than 40% or 50%.

MR. FRANCIS: There is practically no salvage on part of this plant. There was the lining plants that were very special things and the Americans who undertook to build them fell down on the job and a certain amount of money was spent on some things that never materialized.

Q. Was there anything of that kind in your jobs, forms for concrete? A. No, that machinery is so special that it is not easy to sell. One of the points we have in minds when we buy machinery is to consider whether it will be saleable after we are through with it.

Q. Do you think the question of salvage was considered as carefully as it should have been when they selected the machinery for this work? A. They were buying bigger shovels than had ever been bought for that kind of work before but these big shovels had come into use in quarries and on ore digging and coal shipping. I would not have estimated they would only get \$2,500,000, I would have thought they would

have got more.

Q. Do you know anything about the machinery that they used on this canal? A. I have only heard of the electric locomotives and electric shovels and the concrete forms and cars. I have heard of that special machinery.

Q. Do you know that it is difficult to realise upon that any salvage? A. I do not think so; big machinery cannot be sold as readily as small machinery.

MR.FRANCIS: They sold two big shovels inside of two weeks and they got more than it was agreed they should sell them for.

TO COMMISSIONER HANEY:

Q. The cost of unwatering that plant was put in at \$1,800,000?

A. I have no idea what they did.

Q. You would not have any idea as to what was necessary?

A. Not without making a study of the plant. I have never heard what unwatering they had to do, it is a most difficult item to figure.

Q. In prosecuting a work of that kind is it generally considered good practice to avail yourself of grades to get your water off rather than pumping it out with a hose?

A. Well, we would make an estimate of the cost of pumping and an estimate of the cost of a drain for comparison in such a case.

TO THE CHAIRMAN:

Q. There were certain estimates made for this work in 1920; had working conditions at that time become sufficiently stable that it was possible to make an estimate? A. 1920 was right in the peak and anybody estimating then should come out on the right side because the costs have come down

steadily since 1920.

Q. Would you say since August, 1920? A. The break was right about that time.

TO COMMISSIONER R.A. ROSS:

Q. Material costs were at their peak in May, 1920 and I fancy labour costs would be a month or two later? A. Some big jobs were discontinued in September. We had a big job cancelled in September 1920 and costs were just tumbling from that time and anybody making an estimate on the 1920 cost in 1920 would be sure to over-estimate.

Q. Would your experience apply to this district? A. Yes, I think so, the jobs I had in mind at that time were Ontario jobs. An estimate for work in 1920, I should say, would have been over-estimated.

THE CHAIRMAN: You were to give us the unit cost of the original estimates.

MR. FRANCIS: The lining concrete on the bottom was \$6.50 and the re-inforced concrete on the side \$10 and the concrete in Bowerman's Cove was \$6.50 in the bottom and \$12 on the sides; this was in November, 1917. Generally they were estimating plain concrete at \$6.50 and re-inforced at \$8 and some re-inforced at \$10.

MR. FRASER: Did they work it out so much cement and so much labour and so on?

MR. FRANCIS: No, they did not make their estimate in that way.

TO THE CHAIRMAN:

Q. How would these prices Mr. Francis has given you, compare with estimates for similar work you were making at that time, at the end of 1917? A. They are lower than ours.

Q. What were your estimates for the same kind of work?

A. There is a lot of material in the concrete and I do not know what his material prices were.

Q. You were making estimates about that time? A. Yes, we were for other places, freight on our cement might make it greater and some in places we might be able to get the rock out of the excavation

Q. They got the rock out of the excavation and crushed it and they paid as high as \$4 a barrel for some of the cement?

A. I do not know that I could set a comparative price, there are too many elements entering into it, I know we estimated no concrete as low as that at that time.

Q. As a matter of fact, the actual cost ran up to \$21 and \$30 how do you account for a simple block of ordinary concrete costing \$24? A. I could not say.

Q. How did the cost of cement at Niagara compare with the average cost, was the transportation higher than the average?

A. No, it would be lower.

Q. There is an item of \$1.88 per cubic yard for superintendence of concrete work? A. That looks like bad distribution. If you tell me where the stone was secured and where the sand was secured and the charge for crushing I would be able to give you a figure.

COMMISSIONER R.A.ROSS: I think the best thing would be for Mr.Fraser to give his prices at that time.

COMMISSIONER HANEY: I cannot conceive of any piece of work being more accessible and materials more easily obtainable than the Chippawa work. I do not think you did any work during this period that was as accessible to materials as the Chippawa work.

MR.FRASER: There was certainly no transportation problem. What we are discussing now is an estimate of the work and the comparison of the prices made in 1917. I may be able to help you in some way, if I can I will do so.

--- Adjourned at 5 P.M. until 11 A.M. tomorrow,
23 rd of May, 1923.

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HYDRO ELECTRIC INQUIRY COMMISSION.

36 King Street East, Toronto, May 23rd/23.

P r e s e n t :

D.W.GREGORY,	Chairman.
M.J.HANEY, Esq.,	Commissioner.
LLOYD HARRIS, Esq.,	Commissioner.
J.A.ROSS, Esq.,	Commissioner.
R.A.ROSS, Esq.,	Commissioner.
J.W.W.BOWERS, Esq.,	Secretary.

RICHARD E. CHADWICK, called.

TO THE CHAIRMAN:

Q. What is your occupation ? A-General Manager of the Foundation Company, Limited.

Q. Where does that carry on its operations ?

A. Head Office at Montreal.

Q. What is the business of the Foundation Company ?

A. General contractors.

Q. Have you specialized in any particular line of work ?

A. We specialize particularly on foundation work, Hydro Electric Power work, under water work generally and certain classes of building work.

Q. Have you done any hydraulic power work of recent years ?

A. Yes.

Q. What ? A. We built the Two-Mile Falls Plant, St.Francois River, near Sherbrooke, the power plant on the Maurice River, St.Jerome, Quebec, for the Canadian Consolidated Rubber Company; a small dam at Paris, Ontario, for Penman's Limited, and a dam at Ottawa for J.R.Booth,Ottawa Electric Railway; and a power plant at Buckingham,Quebec,for the Production

Company. These are the principal jobs in Canada since the war.

Q. Do you do any work in the United States? A. We are associated with the Foundation Company in New York that carried on business throughout the States and in South America.

TO COMMISSIONER HARRIS:

Q. Did you do any work in France in the devastated areas?

A. Yes, we have done a lot of work in France.

Q. Did you get a lot of building work over there?

A. Yes, we re-built part of Louvain.

TO THE CHAIRMAN:

Q. You were asked, I believe, by the Chief Engineer of the Hydro Electric Power Commission of Ontario to submit tenders for the Queenston-Chippawa Canal? A. Yes.

Q. That would be on December 29th, 1916? A. I do not remember the exact date.

TO COMMISSIONER HARRIS:

Q. You know Mr. Acres very well? A. Yes.

Q. Were you at school together? A. Yes. I think he was possibly a year ahead of me; I know him very well.

TO THE CHAIRMAN:

Q. Which of these jobs that you speak of were Hydro Electric jobs? A. All of these jobs.

Q. Do you know just what dates you did the different work? A. I could not give the dates of all of them; they were all since 1915.

Q. And prior to 1922? A. Yes, prior to 1922.

Q. They cover the war period and a year or two afterwards?

A. Yes.

Q. Did you submit tenders in any of these contracts?

A. We submitted tenders for all of them; most of them were on the fee or percentage form of contract. Some of the work at Buckingham, Quebec, was on a lump sum contract.

Q. That is, you offered to do the work for a certain price?

A. Yes.

Q. Did you get the contract in that way? A. Yes.

Q. When was that one? A. That must have been about 1916.

Q. And the work was done when? A. I do not remember exactly, but I think it was the summer of 1916.

Q. Were there any others in which you did the work for a fixed sum? A. I think that is the only Hyatt Electric Contract we had at that period at a fixed sum.

MR. FRANCIS: A lump sum contract is one thing and cost plus a fee is another thing. I think if the contract was done for a lump sum it had better be so stated.

MR. CHADWICK: Where I refer to a fixed sum, I mean either a lump sum price or a unit sum contract; it is just the same to us.

TO THE CHAIRMAN:

Q. Were there any special difficulties in the way at that time of doing the work under such a form of contract, a lump sum contract or unit price contract?

A. Do you mean speaking generally?

Q. Yes? A. Yes, I think few if any contractors would bid a lump sum or unit price at that period except possibly for a contract that could be completely carried out in a short period, say six months.

Q. If it was for a short period there would not be much fluctuation in cost in that time? A. There was a lot of fluctuation but nevertheless we would take a chance on a short term contract.

Q. What were the principal fluctuations? A. All materials were jumping up and down at that time; if I remember correctly, principally increasing. We did not know where we could get labor. We did not know what the Government was going to do in the way of conscription or possibly conscripting labor for war purposes. We did not know where wages were going to go to.

Q. That would be in the summer of 1916 or the spring?

A. Throughout that whole period.

Q. I am speaking of the time you took this contract, the difficulties that existed at that time? A. You are speaking of the Buckingham contract, yes we had the same difficulties there.

TO COMMISSIONER HARRIS:

Q. How long did it take you to do that work?

A. One summer.

Q. That is the only contract you took at a lump sum?

A. That is the only Hydro Electric Contract.

Q. Did you take other contracts during that difficult period on a lump sum basis? A. I would not say for sure but probably we took other small contracts, but no big ones.

TO THE CHAIRMAN:

Q. What did that contract amount to in dollars?

A. I do not remember exactly, probably under \$100,000 it was a small contract.

Q. When did these difficulties in fluctuation of price in materials and labor begin - about 1916 or earlier?

A. My recollection is somewhere in 1915.

Q. And continued until what time? A. Probably about 1920.

Q. After 1920 were they fairly stable? A. Yes, we found our costs fairly stable since 1920.

TO COMMISSIONER HANEY:

Q. On the down grade if anything? A. They would go down and up; they went down for a period and then up again. Generally the tendency was downward from the war period.

Q. From 1920? A. Yes, I would think the general tendency is downward since 1920.

TO COMMISSIONER R.A. ROSS:

Q. Are things settled yet? A. They are never absolutely settled.

Q. They have got on a higher plane if you like, but there is still more or less difficulty? A. Yes, last year, 1921-22, we found very satisfactory years so far as prices and labor and all that kind of thing.

Q. Efficiency? A. Yes, efficiency was good in 1921-22; this year we are a little bit nervous; we do not know where our costs are going to go this summer.

Q. Owing to what? A. Owing to the fact that our labor rate in Canada as a rule is so much lower than in the United States, and all our men are leaving and going to the United States. There is a boom over there and a shortage of mechanics, and skilled men in Montreal district, I do not know how it is here.

Q. Labor will find its level, if the men leave here it will have a tendency to put up the price of labor here?

A. Yes.

Q. Until labor won't have to go to the United States to get the increase? A. Yes, or until the boom breaks which it shows signs of doing now.

TO COMMISSIONER R.A. ROSS:

Q. I understand they cancelled a lot of contracts in New York? A. Yes.

Q. Millions and millions in order to protect the situation?

A. Yes.

TO THE CHAIRMAN:

Q. Have you taken any lump sum contracts since 1920?

A. Yes, a good deal of lump sum work, principally building work and Hydro Electric Power work. And there I am referring to contracts where we get paid cost plus a fee or a percentage on a guarantee of an upset price.

Q. You guarantee it won't exceed a certain sum? A. Guarantee absolutely it won't exceed a certain sum.

Q. If it does exceed that sum have you to make it up yourselves? A. Yes.

Q. That is a lump sum contract? A. No.

Q. Do you get any benefit of the saving? A. Usually a half, sometimes a third. I think all our contracts last year of any kind were guaranteed in that way, or unit prices.

Q. Do you recall this correspondence with the Hydro Electric Power Commission of Ontario? A. Yes.

Q. What was your first connection with that? A. I do not remember the details, whether I approached Mr. Acres or whether he wrote us.

Q. There is a letter from yourself to the Hydro Electric Power Commission, attention of Mr. H. D. Acres, dated December 29th, 1916, and then there is another from you of the same date to the Commission? A. Yes, I came to Toronto and saw Mr. Acres.

Q. Were you requested by Mr. Acres to come to Toronto to see him? A. I am not sure as to that. I think that the Commission or probably Mr. Acres invited us to submit a bid; I am not sure of that.

Q. You have no record of that? A. No.

Q. Is there an official letter from Mr. Gaby to you?

A. Yes.

Q. That is a general letter sent out to a number of contractors? A. Yes.

Q. You begin your letter to the Hydro Electric Power Commission "With reference to your invitation for tenders", that would be Mr. Gaby's letter? A. Yes, that would indicate that they had invited us.

Q. "We are mailing you under separate cover plans and specifications", that is the way the letter beings? A. Yes.

Q. "We would like you to submit a tender price per yard for the excavation of earth and rock in connection with this work"? A. Yes.

Q. Is that the letter to which you refer in your reply?

A. Yes, I recollect that now..

Q. You came up to Toronto and you saw Mr. Acres?

A. I saw Mr. Acres and I think Mr. Hogg.

Q. Did you understand at that time that they wished you to submit a tender having in view that they were considering accepting tenders, or was it a matter of form?

A. We did not know. We felt that they were in the market to get unit prices on that work, and that probably if they could get satisfactory unit prices they would let the work by contract on that basis.

Q. You thought at that time they were open to let the work by contract if the prices were satisfactory?

A. Oh, yes.

Q. What happened after you got these letters? A. My recollection is that I talked the situation over with Acres and suggested that we might do the work on a cost plus a fixed fee or a sliding fee.

Q. What do you mean by a sliding fee? A. I mean by a sliding fee that we would give an estimated cost of the work and undertake to do the work for cost plus a stated fee with the further understanding that should the cost of the work exceed our estimate, we would stand a certain proportion of the overrun, and if the cost was less than our estimate, we would be paid a bonus of a certain part of the savings.

Q. Do you know what proportion that would be? A. I do not think we ever submitted that; I do not think we ever got to that stage in the negotiations.

Q. Why is it you did not submit an offer of that kind?

A. We wrote the Commission that letter you see there and we got no reply to it.

Q. You got no reply to your letter? A. No.

Q. Did you have any conversation with Mr. Acres or the Chief Engineer after you had written the letter?

A. I do not think so.

Q. When you received no reply did you have any further communication with them? A. I do not think so.

Q. When you received no reply to it why did not you follow it up? A. When we received no reply, we felt that the Commission were not open to that kind of a proposition and we did not waste any more time on it.

Q. You heard nothing more from them? A. No.

TO COMMISSIONER HANLEY:

Q. Did you have ample time to make an investigation of the work so as to put in an intelligent tender between the time you received Mr. Gaby's letter on the 1st of January? A. No, I do not think so; it was a very short time I remember.

Q. His letter is the 27th of December and he asks for the tender to be submitted by the 5th of January?

A. That would not give us time to make any kind of investigation at all.

Q. Did that make any impression on your mind that the tenders would be required for a guide to the Commission or that they wanted bona fide tenders?

A. Frankly we felt they were just fishing for prices and to find out what contractors would do. It would be absolutely impossible to get a proper tender in in that time.

Q. Do you think they had sufficient knowledge of that character of the work to realize that? A. Oh, they should know that a contractor could not prepare an intelligent bid for work of that magnitude in that time.

COMMISSIONER R.A. ROSS:

Q. Would you have taken on a lump sum contract for that job at that time?

Q. I do not think so; the policy of our company was to avoid lump sum work except as I have said for some things where we could proceed and finish in the year.

TO THE CHAIRMAN:

Q. You would have given an estimate and made a contract with them whereby if it had exceeded that estimate you would have borne a share of the loss, and if it were less than the estimate you would get a share of the saving? A. Yes, we were prepared to submit an estimate and a fixed fee for doing the work, and to stand half of the overrun in the event of the cost exceeding our fee, but up to the point where our fee would be absorbed.

TO COMMISSIONER R.A. ROSS:

Q. In other words on a diminishing fee for the overrun?

A. Yes.

Q. You were prepared to lose half your fee? A. We were prepared to lose all our fee and do the work for nothing.

Q. If there were any greater loss than your fee, you would not be responsible for that? A. No.

Q. You insure them to the extent of your fee? A. Yes.

TO THE CHAIRMAN:

Q. You do not mention that in your letter, was that expressed by you in your conversation with Mr. Acres or Mr. Gaby? A. I do not think I ever had any conversation with Mr. Gaby; it was with Mr. Acres. I do not recollect whether we went into the details of the proposition at that time or not. My recollection is that I proposed this form of contract to Mr. Acres. I think I got the

impression he was favorably disposed towards it, that he asked me to write a letter to that effect to the Commission which I did.

Q. In a contract of that kind, about what percentage would you figure on as a proper fee?

A. I will explain our general practice: We do a tremendous amount of work on various percentages or fee forms of contract, most of which we guarantee in some way either by an upset price beyond which we pay all the costs or by an upset price beyond which we may stand half the overrun. It is our custom to always supply the plant ourselves as part of our fee. By plant I mean, power driven machinery, exclusive of hand tools and small items that are used up in the course of the work like picks and shovels and wheel barrows which are always charged to the cost of the work.

Q. What about camps? A. On a contract involving camps, the cost of building and equipping a camp is part of the cost of the work and the revenue from the camp is credited to the cost of the work.

Q. Then you would not supply the camp as part of the plant?

A. Well, the camps would be built for each particular job. We would supply the bunks and that sort of thing, but the camps we would charge to the cost of the work, and loading and unloading and transporting the plant, repairs while on the work and depreciation at a rate somewhere between 2% and 3% per month depending on the length of the contract it is usually $2\frac{1}{2}$ or 3%. To answer Mr. Ross' question, the fee on that kind of work where we get the plant depreciation varies from 6 to 10%, or more usually from 8% to 10%.

Q. Is the service railway part of the cost of the work? A. Yes, although we would supply the locomotives as part of our plant and we would supply cars as part of our camp; we might or might not supply rails as part of our plant depending on the dealing with the owners.

Q. On the basis per month that you have indicated?

A. Yes, the rental of the rails would be a lower rate.

Q. On account of the salvage? A. Yes.

Q. This depreciation you speak of is really a sort of rental for your plant? A. You can call it either, it is really depreciation.

TO COMMISSIONER HANEY:

Q. On this work did you contemplate supplying all the plant yourself on the terms you have mentioned, where a large amount of plant would be required? A. Yes, I think so, although if there were any items of the plant that would be built specially for this work and not of a nature that would be used on other work, that would have to be charged to the cost of the work, that would be by agreement with the owner.

Q. Would that embrace electric shovels? A. I doubt if we would use electric shovels on that job.

Q. If the Commissioner ordered them, you would expect them to supply them because they would be special?

A. Yes, we would not want to invest in electric shovels because they could not be used afterwards.

Q. Would you use such a type of shovel as was used there?

A. 320 ton shovel, h.r. bucket travelling on a double track with a lift of 68 feet? A. I could not say as to

because I never went into it far enough to find out what our plant would be, but I think we would use the standard shovel; I do not think a contractor would or could load up with that kind of equipment.

Q. You would use standard plant throughout, is that what you mean? A. Yes, we try to stick to the standard plant, unless the efficiency of the use of such a shovel would be that we would afford to write it off at the end of the contract.

Q. What would be the charge against the cost of the organization, what part of the organization cost would be charged into the cost of the work? A. All of the employees on the job, that is all the labor, superintendents, timekeepers, office men and so forth on the job. So far as our main office is concerned, no part of the salaries, but travelling expenses directly chargeable to that particular job.

TO COMMISSIONER R.A. ROSS:

Q. Every man in your employ whose total time was charge against that job, would be included in the organization cost? A. Yes, provided he were working out on the job.

Q. As a matter of fact all the correspondence, paper, envelopes and telegrams would be charged to the job?

A. Yes, originating from the job office.

Q. It would only be the head office in Montreal that would be at the disposal of the work at broken periods?

A. Yes, that would not be charged.

TO THE CHAIRMAN:

Q. You did not put that in the form of a letter to the Commission? A. We never gave a detailed proposition.

Q. Is this what you discussed with Mr. Acres? A. Yes, in a general way.

Q. Did you tell him you were willing to do the work on the basis you have outlined to us? A. I do not know that I went into details as to what would be charged to the cost of the work and what would not; we discussed it in a general way.

Q. In a general way did you say you would be prepared to do the work on that basis? A. Yes, Sir.

Q. What objection if any was raised to letting you have the contract on those terms? A. I do not think Mr. Acres raised any objection; in fact I got the impression, which may have been right or wrong, that he was favorably disposed toward that, but the Commission would not be.

TO COMMISSIONER HANEY:

Q. He was of the opinion the Commission would not be?

A. I think he was of that opinion; that is the impression I got in talking with him.

Q. Did you know at this time that the Commission had decided by resolution to do the work themselves?

A. No. You mean before they had invited these bids? No I did not know that.

TO COMMISSIONER HARRIS:

Q. Did you get the impression you did not have a ghost of a show of getting any contract on this basis or any other? A. I more or less got that impression after talking with Mr. Acres. For that reason I wrote the letter as I promised him and forgot about it.

TO COMMISSIONER R.A. ROSS:

Q. As a matter of fact did not you and Mr. Acres and all the rest of you come to the conclusion it was pretty near a hopeless thing to get a lump sum contract on that job? A. Oh, I think so, yes.

Q. Any contractor who went into that game in that period would be certain of going on the rocks in a short time? A. Yes, they would.

TO THE CHAIRMAN:

Q. We have no record of any contractor who ever considered giving a lump sum contract; I was asking you about the terms upon which you would be prepared to take it?

A. I do not think any contractor could possibly have taken that on a lump sum contract.

Q. What I was questioning you about was your willingness to take it on the terms you have outlined?

A. Yes, we would have taken it on a sliding fee.

Q. In your letter to the Commission you seem to emphasize the value to the commission of having a staff like yours in charge of the work. You say here: "We claim that a contractor doing a large business has advantages not possessed by any organization, however efficient, which is not continuously engaged on a large scale in the construction business. The contractor has available a large corps of experienced men, ranging from executives, managers and superintendents, down to foremen and skilled workmen, all of whom have made construction work their specialty. These men are employees of long standing, and possess a loyalty to their organization not possible in a force organized for a single piece of work. Their personalities

and capabilities are well known to their employers and to each other, and from the commencement of the work the organization operates as a trained unit. The value of such an organization is demonstrated by the fact that it is customary for contracting companies to hold their leading men on pay through dull times, often sacrificing a large sum of money rather than lose their organization. This policy is not prompted by sentiment, but by ordinary business judgment, as it is known that when good men are let go they immediately get employment elsewhere, and are not available at a moment's notice. The men that are available are those, who in the judgment of their former employers, were not worth holding. The use of this organization is what an owner gets for the fee paid a contractor". Do you consider it of any special importance to have the work in charge of a trained organization like that? A. Yes, there is no question about it.

Q. What are the advantages other than those mentioned here that your organization would have over an organization which might be created by the Hydro Commission for the construction of that particular work? A. We would have an organization that is trained in that business and trained to work together. They would have the same advantage that a trained army would have with a staff and organization, against a crowd of raw recruits that were just enrolled and did not know their drill and did not know each other and did not know their officers, and their officers did not know their men.

Q. Would you consider that an element of great importance in the construction of work like this?

A. Absolutely; we could not take and we would not hope to take a contract and guarantee any costs if we had to go on and hire new men; we would be willing to go out and hire some new men but not a whole new crew.

Q. Minor men? A. They might be major men or leading men; if we got a new superintendent we would want an old general foreman.

Q. You would want the nucleus? A. Yes.

TO COMMISSIONER JA.ROSS:

Q. It would be all the difference between a plant in production and one starting up on new business?

A. Yes, or a new plant where the men did not know their jobs and did not know their places, where the men had not all been fitted into their various grooves; they are like a scratch football team against a highly trained and organized football team.

Construction work is the same as anything else.

Q. Is that a fact; it is the same as anything else?

A. In that respect.

COMMISSIONER HANLEY: I quite agree with you.

TO THE CHAIRMAN:

Q. A man might be a very highly skilled engineer and might not be a success in the management of construction work? A. Generally the man who has ability to design is not a good construction man. The personalities of the two men naturally differ. We cannot in our organization as a rule switch men between our engineering

and our construction departments.

Q. There are special qualifications required in each?

A. Yes, absolutely; one is a highly technically trained engineer, the other may be an engineer, he may not be able to read or write but he has had experience in outside work and he has the ability to handle other men.

COMMISSIONER HANEY: Many of the successful contractors in olden days could hardly read or write?

A. Yes, some of our best superintendents cannot do much more than read and write.

COMMISSIONER R.A. ROSS: Q. Are you a graduate?

A. Yes I graduated in 1906.

Q. Do you get along pretty well as a contractor?

A. Yes, when times are good.

Q. In other words, an engineer can do special business and a contracting business when it comes along?

A. I have got a superintendent working for me who is a much better superintendent than I would be.

TO COMMISSIONER HANEY:

Q. How long did you follow the technical side of it before you engaged in the contracting side, the management?

A. I do not think I ever worked at pure engineering except for a short time when I was out of a job in my earlier days when I passed as an engineer for about a year.

Q. You simply had a school knowledge, that is a great benefit to you? A. Yes,

Q. Unspoiled by super-technical training? A. I have always been on the practical side of the work.

COMMISSIONER R.A. ROSS: Q. At the present time the big contracting firms are mostly officered by engineers; the

old fashioned contractor is no longer on the job?

A. No, I would not say that; there is a tendency toward technical superintendents, that is, we are more and more getting college men in charge of our construction work. The old superintendents as a rule are not college men; ten years from now, the big superintendents will be college men and college men will gain by experience. In our own company our Mr. Remington, who was our president for a great many years and who is now Chairman of the Board of Directors, is not an engineer.

Q. Some old contractors would have been a great deal better if they had had some technical education?

A. Unquestionably the best superintendents will be the men who have gone through college as engineers, and who have gotten into the practical end of the business when they got out and have practical experience and have a turn in that direction.

TO THE CHAIRMAN:

Q. They have not stayed long enough with the purely technical work to spoil them for construction work?

A. No, it takes a different personality.

TO COMMISSIONER HANEY:

Q. Could they not be trained while they were at school, if the school would allow us to make that a branch of their education? A. I do not believe you could train a man in the construction business in a school; you have to train him in the school of experience.

COMMISSIONER R.A. ROSS: What you train a man for in college is to use his brains and sharpen his tools, and then when they get sharpened he will drift in

the proper direction. I could make a good engineer out of a fellow who was brought up on theology.

A. We are taking men today out of college, sometimes before they have finished their course; we take them for the summer and we try to put them through all the branches of our business for the sole purpose of training them as superintendents; they are sort of apprentices.

TO COMMISSIONER HARRIS:

Q. After they have had their college education?

A. No, we sometimes take them in while they are in college and give them a job in the summer and then give them a job after they get through college.

TO MR. FRANCIS:

Q. Don't these men when they go out always come under the control of the engineers at the head office?

A. Not always, they are under the control of the superintendent on the job and he may be a practical man. The company has been criticized by some engineers because on occasion we have had technical engineers, college men working under the direction of a man who could not read or write; we claim that these fellows have got to learn the business and they have got to learn it from people who are able to teach them; they are not there to learn to read and write - but they are there to learn to handle men and to meet emergencies.

TO THE CHAIRMAN: When you had this interview with the engineers of the Hydro were any estimates that they had made submitted to you; did you see any of them?

A. I do not think so.

Q. Did they discuss with you any unit cost or anything of that kind? A. No, I do not think we got as far as discussing unit costs. I could not have discussed unit costs because we never made an estimate of it.

Q. Was there any data submitted to you?

A. There were some plans; I think there were a very brief specification.

Q. Was there any comprehensive plan of the whole work submitted to you? A. No.

Q. Did you know if there were any such plans at that time? A. I do not know, but I assume there were not because they did not submit anything to us.

Q. Have you got any data here showing the change in the cost of labor from ~~1914~~ 1914 to 1921 inclusively?

A. No, I have not.

Q. Do you know what you were paying during that period?

A. No, not accurately.

Q. At this time when you had these interviews with them, that would be in 1916 and 1917? A. I would hesitate to say without looking up our records. My recollection is that labor prices were jumping around that time, and we were paying one price one month and something else the next, and labor leaders were out over different parts of the country.

Q. You were doing some work in the neighborhood of Chippawa at that time? A. Yes.

Q. Have you any data showing what you were doing at that time? A. I have not got it with me.

Q. When did you finish at Port Colborne? A. I would have to look that up.

Q. Could you let Mr. Francis know what you were paying for labor on that job at the different periods?

A. That work was for the International Nickel Company building a refinery. I can furnish you with our labor rates at that date.

Q. That was a building? A. Yes.

Q. You were constructing a refinery for the International Nickel Company at Port Colborne which is only a few miles from the Chippawa work? A. Yes.

TO COMMISSIONER HARRIS:

Q. It would be interesting to know whether or not laborers were paid more on that particular job than on other jobs because of the Chippawa work, because that must have had an effect on that whole locality? A. Yes, during the course of the Chippawa work it increased wages throughout that whole district to such an extent that we would not bid anywhere in Western Ontario on account of the rates paid at Chippawa.

Q. Were they paying higher rates at Chippawa than elsewhere? A. They were paying higher rates than we were paying anywhere in Canada.

Q. How was it they were paying higher rates than you; had they to pay higher rates to get the men?

A. In fairness to the men who were running the job, they had to have that work finished and they would probably have to pay rates high enough to attract men there.

Q. If the men knew it had to be finished? A. Further in fairness to those men, wages in Ontario, and particularly in Western Ontario, are higher than they are in the Province of Quebec. The bulk of my particular work at

that time was in the Province of Quebec; there is no question that work did increase the rates; there is no question any big piece of construction work would increase the rates.

Q. Can you make a comparison also of the rates you were paying in Montreal and in Ontario? A. Yes.

Q. You have a more stable labor market in Quebec than we have in this Province? A. Yes, we have, but any big piece of construction work during a period when there is a shortage of labor is bound to increase the rates. Even in the Province of Quebec today, the work on the Saguenay River will probably increase the rates, probably has increased the rates in that district. The contractors in that district are a little nervous as to what they may have to pay.

Q. In your letter you say that you have purchasing agents at different points, Port Colborne, Montreal, Pittsburg and Chicago that give facilities that as far as you know are not possessed by any other contracting company; what advantages would you have in purchasing material, if any, over an organization such as the Hydro Commission? A. We would have the advantage that we are in the market all the time for that class of material. We are in the market at several different points in the United States and in Canada. It is often an advantage for us to buy steel in Pittsburg rather than Montreal; at other times it may be to our advantage to buy in Montreal and keep out of the Pittsburg market, or it may pay us better to buy our steel in Hamilton.

Q. The Hydro Electric Power Commission had an organization why could not they purchase as low as you could?

A. I do not know what organization they had, but it is not likely that they had a contractors' purchasing department, any more than we would have a purchasing department capable of buying to advantage the mass of stuff the Hydro must buy, such as electrical equipment. We would be more or less lost in trying to buy that. .

Q. The knowledge which you had acquired through your purchasing staff would help you to get it at a lower price than any other organization going in without experience? A. It would help us on price and on delivery and we would know where to go to get quick delivery; we would have the ordinary trade connection.

Q. The purchasing of material at that time I suppose was difficult? A. Yes, very difficult.

Q. So that it was of special importance I gather, from what you say that it should be in charge of men of experience? A. Yes, we had to know the market very well in order to get any kind of delivery. There was a shortage of almost every material and it was necessary to know where these materials were available.

Q. When you submitted your proposal to them, did you discuss with Mr. Acres the period within which the Commission required the work to be done? A. I do not remember as to that.

Q. They tell us that their plan was to have it done in three years from that time; have you a knowledge sufficient to say whether it could be done within that period?

A. No, I would have to make a study of the whole thing; there was no time to make a proper study of it.

Q. They only gave you six days in which to put in your bid? A. It was some very short time.

Q. Have you on your records anything which would show how the increased cost went up within a certain time?

A. No, I have not got any figures as to that.

Q. Have you anything to show what the increase was from the 1914 to 1917? A. I have no figures with me that would show that; it would be simply guessing.

Q. What would be the relation of the purchasing agent to the superintendent on the job? A. One of the reasons why a railway company or any industrial organization cannot do construction work as cheaply or as economically as a contractor is that a contractor will always have a purchasing agent inferior to his general superintendent.

MR. FRANCIS: They do not allow the purchasing agent to purchase material on the order of the superintendent.

A. We allow the superintendent to order all material he requires.

TO THE CHAIRMAN:

Q. What would you say to the qualification of this man Salter as a purchasing agent; would he be fully qualified to do the purchasing for construction work?

A. I would probably say no, that he would be very well qualified as a purchasing agent for the Hydro Electric Power Commission, but not as a purchasing agent for a construction contract.

MR. FRANCIS: All the purchasing agent did here was to receive a list of the goods, and presumably he bought

Page 1

1. The first part of the report is a summary of the work done during the year.

2. The second part is a detailed account of the work done during the year.

3. The third part is a summary of the work done during the year.

4. The fourth part is a summary of the work done during the year.

5. The fifth part is a summary of the work done during the year.

6. The sixth part is a summary of the work done during the year.

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23. The twenty-third part is a summary of the work done during the year.

24. The twenty-fourth part is a summary of the work done during the year.

25. The twenty-fifth part is a summary of the work done during the year.

26. The twenty-sixth part is a summary of the work done during the year.

27. The twenty-seventh part is a summary of the work done during the year.

28. The twenty-eighth part is a summary of the work done during the year.

TO THE CHAIRMAN:

Q. How would he know what was the best market?

COMMISSIONER R.A.ROSS: He had been in construction work for years.

MR.CHADWICK: Unless he knows the goods he is buying,he cannot buy to advantage.

MR.FRANCIS: He knew all about electric machinery.

MR.CHADWICK: He would be a first rate man to purchase electric machinery, unquestionably.

COMMISSIONER HANEY: I think we are dealing with contractors' requirements for construction purposes which is very different from the regular purchase of an organization.

MR.CHADWICK: Yes,he has got to know the stuff he is buying. As a rule in our organization,the same man that purchases the material for the work does not purchase the plant. The General Superintendent himself purchases the plant.

COMMISSIONER R.A.ROSS: Is not your plant nearly all electrical?

MR.CHADWICK: Supposing you want a rock drill, there are all kinds of rock drills on the market.

COMMISSIONER R.A.ROSS: He would be told by Mr. Acres the kind of rock drill he wanted,and he would be given specifications and he would go into the market with these specifications and do the best he could to purchase that rock drill.

MR.CHADWICK: If he were told exactly what to purchase?

MR.FRANCIS: He was.

MR.CHADWICK: Then he would simply go out and buy that thing.

MR.FRANCIS: He was told,that is the point.

COMMISSIONER R.A.ROSS: Acres would make up his mind that he wanted a certain class of equipment to carry out a certain program,and then he would turn that over with full specifications to the purchasing agent and say: Here, get this for me.

MR.CHADWICK: We have had on several occasions percentage contracts with various concerns where they have undertaken to buy the material through their purchasing department,and it has been a trouble from beginning to end.

MR.FRANCIS: I think the basis of the matter is that Mr.Chadwick has in mind that his superintendent would go and purchase what was necessary. Mr.Acres sent up a requisition and that finally passed through Mr.Angell and Mr.Goodwin and then to Mr.Acres who sent it to the chief engineer,and if the Chief Engineer was satisfied it should be purchased,he gave instructions to the purchasing agent to buy it.

MR.CHADWICK: From a contractor's point of view, that system is all wrong.

THE CHAIRMAN: How do you mean?

A. It goes through so many hands,and finally the man who makes the decision is not the man who is in intimate contact with the work. A construction company could not operate that way and make money. For example,our company could not operate if my superintendent had to requisition things from one man,and then it had to pass in turn to me,and then

and then all down the line again; he would lose so much time between the time he first wanted that thing and the time he actually got it, that he would not need it when it came. The superintendent is authorized to do the purchasing if he wants a thing; it is optional with him how he will buy his stuff.

Q. Does not he send a requisition to your purchasing department? A. Yes, if he wants to.

Q. He has a free hand to buy small stuff that he wants in a hurry? A. He has a free hand to buy practically anything except stuff that is purchased at our main office on a yearly contract, such as cement. Now he does not actually do that, but he has that authority, and that makes all the difference. Our purchasing agent knows that if the superintendent orders a thing and it has to be there next Monday, that if he does not get it there next Monday, the superintendent will go out and purchase it himself, and the purchasing agent will get into trouble; that makes all the difference in the world. For instance, we do a great deal of work with the railways, and upon a straight percentage contract. It used to be customary for them to buy at one time all materials through their purchasing department, and from our experience that was absolutely impracticable. We finally got to the stage where they bought less and less. Today on our contract with the C.P.R., they buy timber if we want to requisition it through their purchasing department. They nominally buy cement; they place an order with the Canada Cement Company through their purchasing department for the total cement requirements for the job, and our superintendent on the job sends in his order

to the Canada Cement Company. We have found that it is necessary to have the purchasing under the control of the superintendent in the last analysis; it is all a question of delivery. The superintendent has got to be like the captain on a ship, you cannot direct a ship from the office; the man on the bridge has got to direct the ship.

COMMISSIONER R.A.ROSS: The purchasing agent on that job would have to be intimately in contact with electrical machinery, and he would have to know people from whom he could buy it. He not only has to be an engineer and a very technical man but also a good purchasing agent.

MR.CHADWICK: I would say on that job they would need two purchasing departments, and two purchasing agents; one man to purchase all this electrical equipment and another who would purchase the day by day requirements of the construction work, the two functions should be separate.

Q. Supposing they had a very big store there where they kept all their small stuff; the big difficulties on construction work are the breakdowns from machinery; the Hydro had a big store and they kept all their supplies in it?

A. Yes, I understand they had a tremendous storehouse; on the other hand the contractor, if he could get away with it without a storehouse, he would do so, and pay more money for the goods. If we were working in a city we try not to have a storehouse at all for the simple reason that if a man knows there is another pick in the storehouse, and loses his pick in the river, it stays in the river; if he knows there is not a pick in the storehouse, he does not lose it in the river, and if he does, he gets it out again.

COMMISSIONER R.A.ROSS: During the war times, an accumulation of supplies in a big storehouse was a practical necessity in order to get the work done, because they did not know when they could get repairs or when anything they wanted would be commandeered by the Government?

A. Unquestionably at that time and on a contract of that magnitude, a big storehouse was an absolute necessity.

COMMISSIONER HARRIS: The bulk of this work was done after the war was over? A. Even so, it was done at a period when materials were hard to get, and things would go off the market without any warning.

Q. They had a great chance in the early part of 1919 to make their purchases and secure everything they required, because for six months everything was in a very uncertain condition; if they had come into the market then, they could have made better contracts? A. Yes, if they could have foreseen; we can look back and say yes, but at the time we might not have foreseen what was going to occur.

COMMISSIONER R.A.ROSS: If we could have foreseen all these things, we would all be millionaires today.

TO COMMISSIONER HANEY:

Q. Is not there another thing that enters into contractors' management of stores or even a railway company - the contractor has not free money available to stock up heavily?

A. Well, that depends on his financial condition more or less. We have done work for clients where we have had a good deal more free money than they have had at times.

Q. Would not there always be a governor as to excessive stocking in of stores for that very reason? A. Well, I think a contractor has to conduct his business as a commercial

proposition. He has got to look after the dollars and cents in a way that an owner doing his own work does not. If a contractor gets into the habit of doing extravagant work, his business is gone, he cannot get work, and he eventually goes out of business. He has got to keep his costs down in order to keep in business.

Q. What is the practice of large railway corporations in connection with any work they do of any magnitude? Is it generally done by contract or by their own organization? A. The C.P.R. do no work themselves if they can possibly avoid it; that seems to be their practice.

Q. They employ contractors? A. They employ contractors.

Q. Either on a percentage basis or lump sum basis? A. Yes, either on a percentage or lump sum or unit price. They will even go so far as to contract their ballast on operating lines. They are doing that right now. During the war, they contracted maintenance of bridges to a large extent to us in the Quebec district, on operating lines.

Q. Comparing the railways with Hydro, would the railways be in a better position to do the work themselves, than Hydro, at the time this work was done? A. I would say, the railways would be in a little better position to do their own work.

Q. But they did not? A. They did not. The Grand Trunk has done a certain amount of work for themselves, principally steam shovel work and on operating lines; I do not think they ever do a new piece of work themselves.

Q. Would that be due to the fact that the work was being done on operating lines? A. Yes.

Q. And things interfering with traffic had to be taken

care of? A. Yes. I do not know of a railway building a newline by day labor.

Q. Are you familiar with the estimates the Hydro submitted to the Government and what the final cost of this work was?

A. No, I am not.

Q. Have you anything here to show what your unit costs were during the war period for removing of earth and rock?

A. You could not compare two different jobs; the cost of removing earth and rock would vary between wide limits, depending on the type of the work. I do not think you could compare two jobs.

Q. Do you know what it was costing you on an average to do that kind of work? A. Oh, yes, it was costing us all kinds of prices for different classes of work. For instance we were taking out earth at Port Colborne at that period and we were hauling the stuff a mile and making a fill with it for 26¢ a yard, as near as I can remember.

Q. For earth? A. Yes, but that was under very favorable conditions and it was a very low price. We dug a ditch around the International Nickel Company's property which was a shallow canal 20 or 30 feet wide, and 10 or 12 feet deep, for probably about 25¢ a yard, but then again that was an abnormal thing; we did not trim the banks; we did not take any care with it; just dug it out and cast it on the side and hauled it away.

Q. Certain elements would be just the same in concrete work? A. Yes, the material would be about the same and the overhead expenses and plant charges on concrete work would also follow between wide limits. The cost of forms

will vary between wide limits and it is very hard to compare concrete costs unless you get two contracts more or less the same.

Q. What was the estimate that was made for concrete work?

MR. FRANCIS: The estimates were from \$6.50 to \$12; \$6.50 was for plain concrete and \$12 for re-enforced.

MR. CHADWICK: \$6.50 a yard would be a mighty low price for concrete work in 1917.

COMMISSIONER HANEY: It would be a mighty low price at any time? A. When I first got out of college, we were doing concrete work at \$6 and \$8.

TO COMMISSIONER HARRIS:

Q. Did you have any rock work at Port Colborne?

A. Very little of it.

Q. What was your experience of the efficiency of labor, skilled or unskilled? A. We had a lot of trouble with labor during that period, when this canal was being built, and the efficiency of labor was mighty low, particularly in Ontario.

Q. They would leave your work and go to the canal and then leave the canal and come to you? A. Yes, we were stealing men from the canal and the canal was stealing men from us.

Q. Was the lack of efficiency greater in the unskilled or the skilled? A. I think we had more trouble with our skilled men than we had with our unskilled men.

Q. Was the trouble with the carpenters or the steam shovel runners? A. I do not think we had very many steam shovel runners working at that time except at Port Colborne, and we happened to have some very good men there, and the steam

shovel work was very efficient. We had a lot of trouble with carpenters.

Q. Have you ever operated electric shovels? A. No, we have not.

TO THE CHAIRMAN:

Q. Speaking generally can work be done as cheaply by a Government commission of this kind as by a contractor?

A. No, I do not think so.

Q. I mean aside from a lack of knowledge of experience in doing it? A. No, I do not think so.

Q. Do men work as well for a Government commission as for a contractor? A. No, I do not think they do.

Q. Can you get the same team play? A. No, you don't, because you don't get the same operation.

Q. Is continuation of employment with foremen and the men an advantage that the contractor has? A. Yes, I do not think any construction men would leave a contractor's organization to go with a concern doing its own work, because when the work is finished they are out of a job. I was personally offered a salary of about twice what I am getting now to take charge of a piece of construction work for somebody who is doing their own work, but that would not be attractive to me because in a year or 18 months, I would be out of a job.

Q. There were three canals in sight when this was started?

A. Well, I do not think any of the men on the Hydro job that I know of, considered that was a permanent job; a number of our men were working on that Hydro job.

Q. What proportion of the cost of the work should the cost of the plant be? A. That will vary tremendously with different jobs.

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Q. How does it run with you? A. I have not figured it out on a percentage basis; it varies so widely with different classes of work that you could not do so. When we are making an estimate, we decide what plant will be necessary for the job, and we list that out and we work out the depreciation on that and put that in our estimate of the cost. Again, that plant will depend largely on the superintendent who is going to do the work. When we estimate work we try to help the man who is going to do it, decide on what plant he will use; that is, we allow the superintendent to decide on the plant he will use.

COMMISSIONER R.A. ROSS: The amount of plant will depend on the schedule you are on as to completing?

A. Yes, if we have to finish it in a certain time.

TO THE CHAIRMAN:

Q. Do you know Mr. Goodwin who was on this work? A. No.

Q. As you are going along with your work, do you know whether you are going ahead or behind your estimate? A. Yes, every month; every day on certain parts of the work; sometimes every week on other parts of the work; with a complete analysis every month.

Q. So that you can tell at the end of each of these periods whether you are going behind or not? A. Yes.

TO COMMISSIONER HANEY:

Q. If you discovered you were running behind pretty badly on one particular item, what would happen? A. We would investigate and find out the reason why.

Q. And correct it? A. Correct it if it could be corrected. We get up against that condition in almost every job we start; some item will go behind.

Do you resort to any means to catch up? A. It is very serious at any time.

Q. More so when you are on a unit price? A. When we are on a unit price, the loss is a direct one to us. If we were on a percentage, we may lose the client. It is very serious to us. It is a direct loss on the contract. I would like to say this that in fairness to the men doing that job, it is generally regarded among contractors that they did a very fine piece of work in quality. They did work that anyone of us would be proud to turn out, though of course the general impression is that the work cost a lot of money, but again in fairness to these men on the job, we all did jobs during that period that cost a lot of money. Our costs were jumping around and efficiency was low, and there is not a contractor in the business that did not overrun his cost - overrun his cost by a pretty wide margin at that time.

TO COMMISSIONER J.A. ROSS:

Q. The same thing applied to any other business? A. I do not know about other men's business, but I know about our own. This is all hearsay and gossip, of course, but pretty good gossip, and a great many of our superintendents worked on this job; we did not have any of this particular class of work at that time, and I think for a period our whole organization was working up on this Hydro job. We found it better to let them go and work up there than pay them waiting time. Several of our superintendents were up at the Chippawa job, and a great many of our foremen. The impression there was that the work was extravagantly carried

on, as far as plant was concerned; they could have almost anything in the way of plant or equipment they chose to ask for. That is what my own men told me.

Again, of course, you have got to look at it in this way: Here is a big job that had to be finished and had to be finished quickly; speed was of great importance, and they had to push it through. For instance, we might have a man out on a job ourselves, and he might be a carpenter foreman, and he might have an idea he could use the forms over three times and that might be an economy; but we might overrule him on that economy and say: "We do not want you to use your forms three times; tear them off and throw them into the river" because the time he would waste salvaging his lumber might cost us in overhead expenses more than he would be able to save.

TO COMMISSIONER R.A. ROSS:

Q. In other words, it does not pay to pick up nails? A. No, it does not. It is a very difficult thing to criticize a piece of construction work. It is difficult for anyone else to criticize another man's construction work because every job is different. Moreover, there is no contractor who ever carried out a piece of work who did not, after it was all over, kick himself and say he could have carried it out some other way and have made more money if he had done so. There is always something else he could see after the work is finished; you always see something that you could have done in a different way; you always get some bright idea that you did not think of at the start.

Q. The only thing you remember about a job, after you are through with it, is the mistakes you made.

TO COMMISSIONER HANEY:

Q. What is your practice in rushing your work; do you rush it at the beginning or at the end? A. We try to schedule our jobs all through. As soon as anything runs a day behind schedule, we get after it, so that there is never any rush operation on the work.

Q. What I want to get your opinion on is: in order to provide a factor of safety for the finishing time, what practice would you employ? Would you do as much as possible in the early stages or wait until the final time? A. That would depend a lot on what our clients wanted. They give us a contract that has got to be finished in a certain time, and we make up two schedules, one a month in advance of the other, and we give one to the client and one to our own organization, and there is always about a month's leeway between the two.

Q. You always try to keep that leeway? A. Yes, we try to keep right up to our schedule.

Q. You lay it out so that you will have so much to do the first year and so much the second year and so much the third year, and you know as the work progresses whether you are keeping up to your schedule or not?

A. We have so much to do every month or every week, depending on how long the job is going to last. We all try to force our work in the early stages for two reasons: one reason is that it keeps a good morale on the job, and gives everybody the impression right from the start that the work is going to go and go fast; and another reason: it gives the contractor more working capital.

TO COMMISSIONER R.A.ROSS:

Q. I have seen a contract started with a rush and a roar and all kinds of labor and material put on the job, and a lot of confusion because the contractor jumped in too big at the start.

MR.CHADWICK: It pays to have time to sit down and plan your work, and plan it to the last detail before you put a man on the job. That would be the best way to do if you could do it, but as a general rule, the client won't stand for that.

TO COMMISSIONER HANEY:

Q. Is it a good practice to get as much time out of your machinery as possible - spread it out over the whole work, get it on the job early and use it until the finish?

A. Yes, that is a good plan if the work is being done by machinery.

Q. Or would you think it would be better to wait until near the end of the work, and then buy a tremendous amount of plant to finish it up in a hurry? A. No, we buy our plant at the start. If we have to buy any plant during the progress of the work, it is due to the fact that somebody has made a mistake. There should not be any plant to buy after you start; if so, somebody has made a bad guess on what is needed.

Q. You provide all the plant to finish the work at the start and then you have it come on as you require it?

A. Yes.

---Adjourned sine die.

